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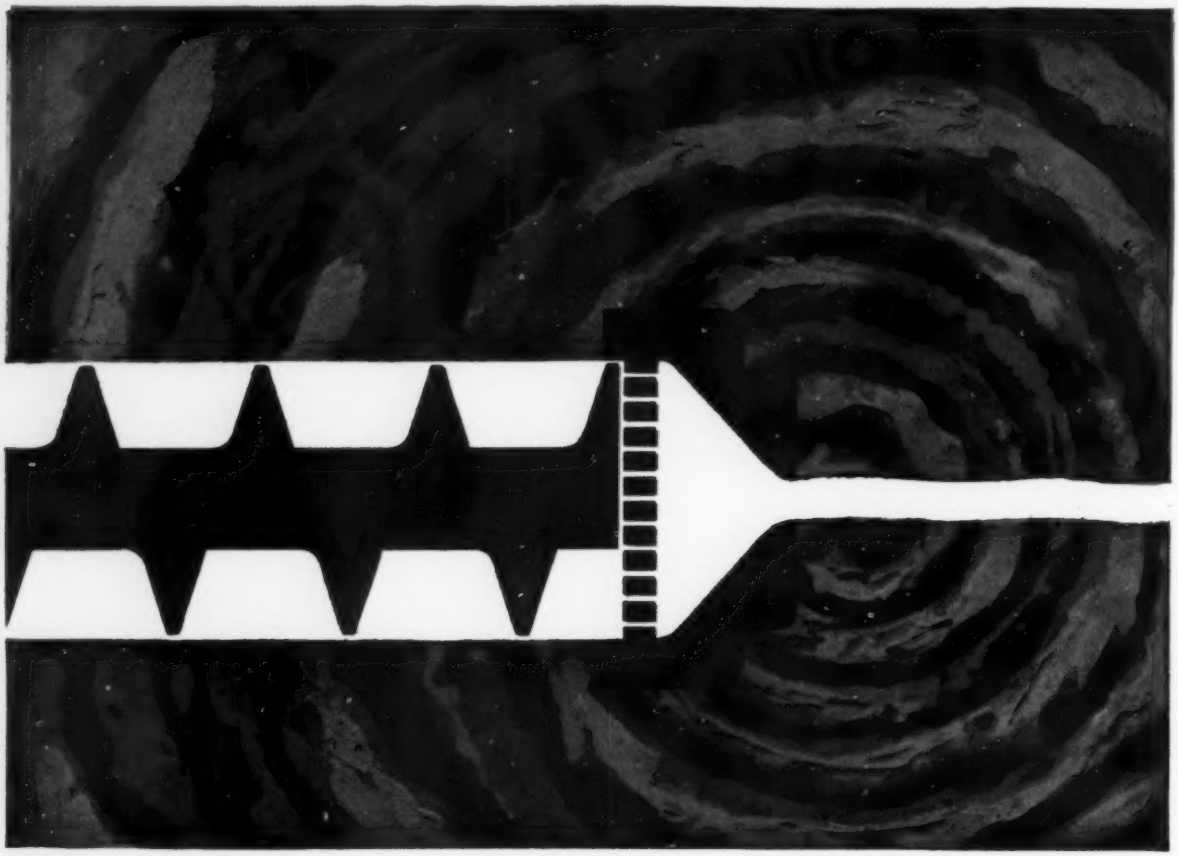

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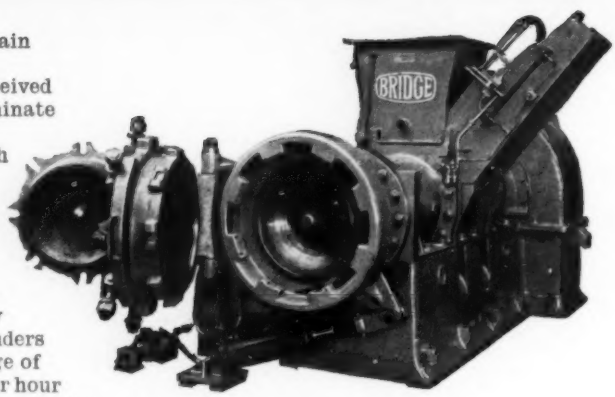

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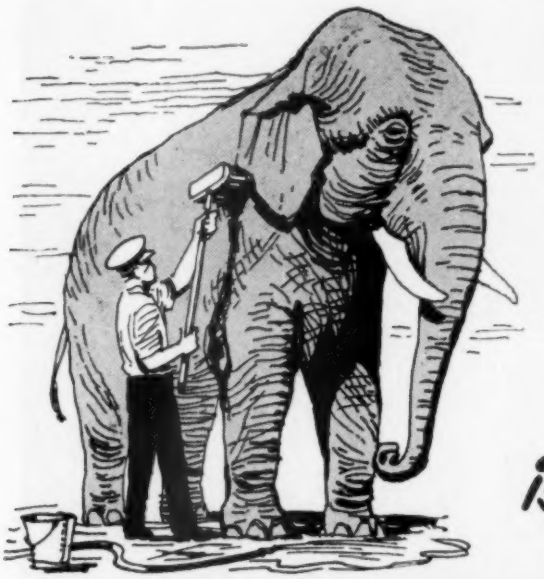

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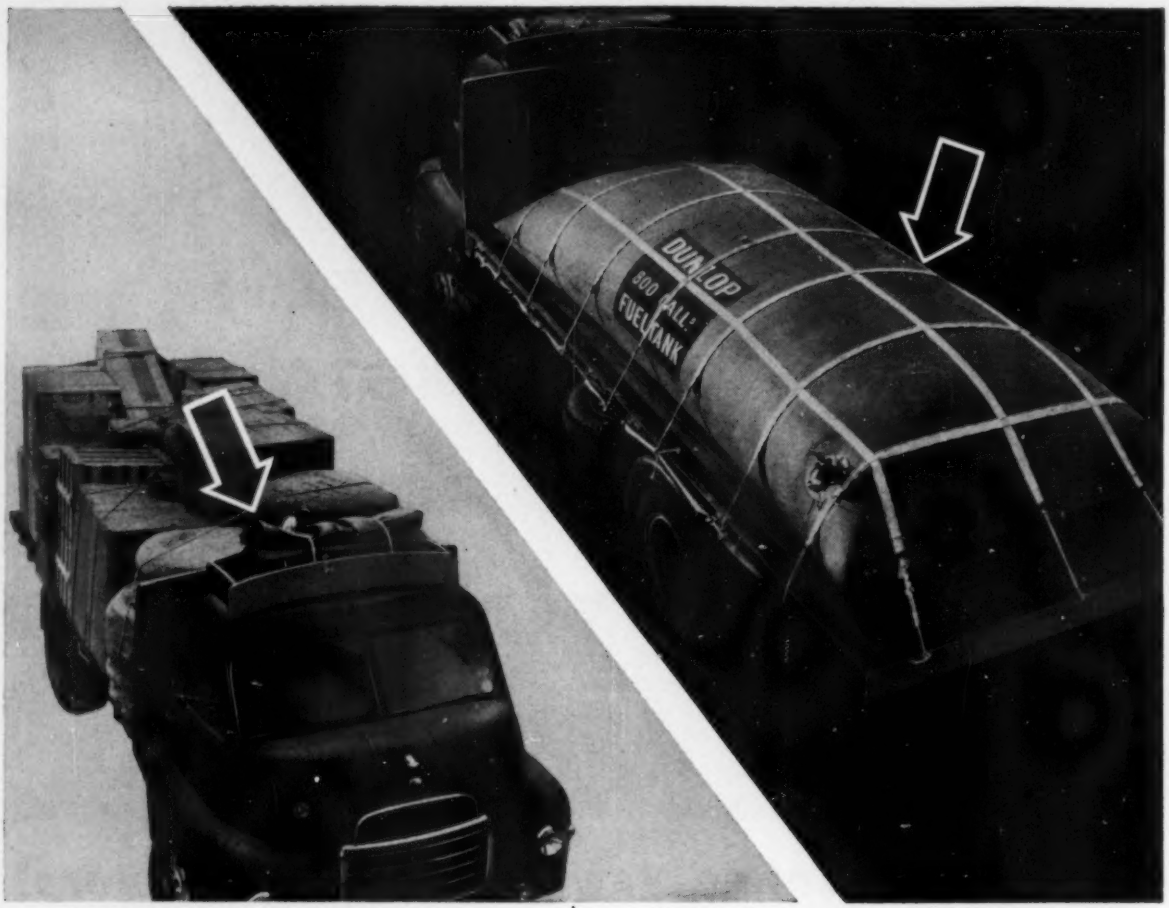

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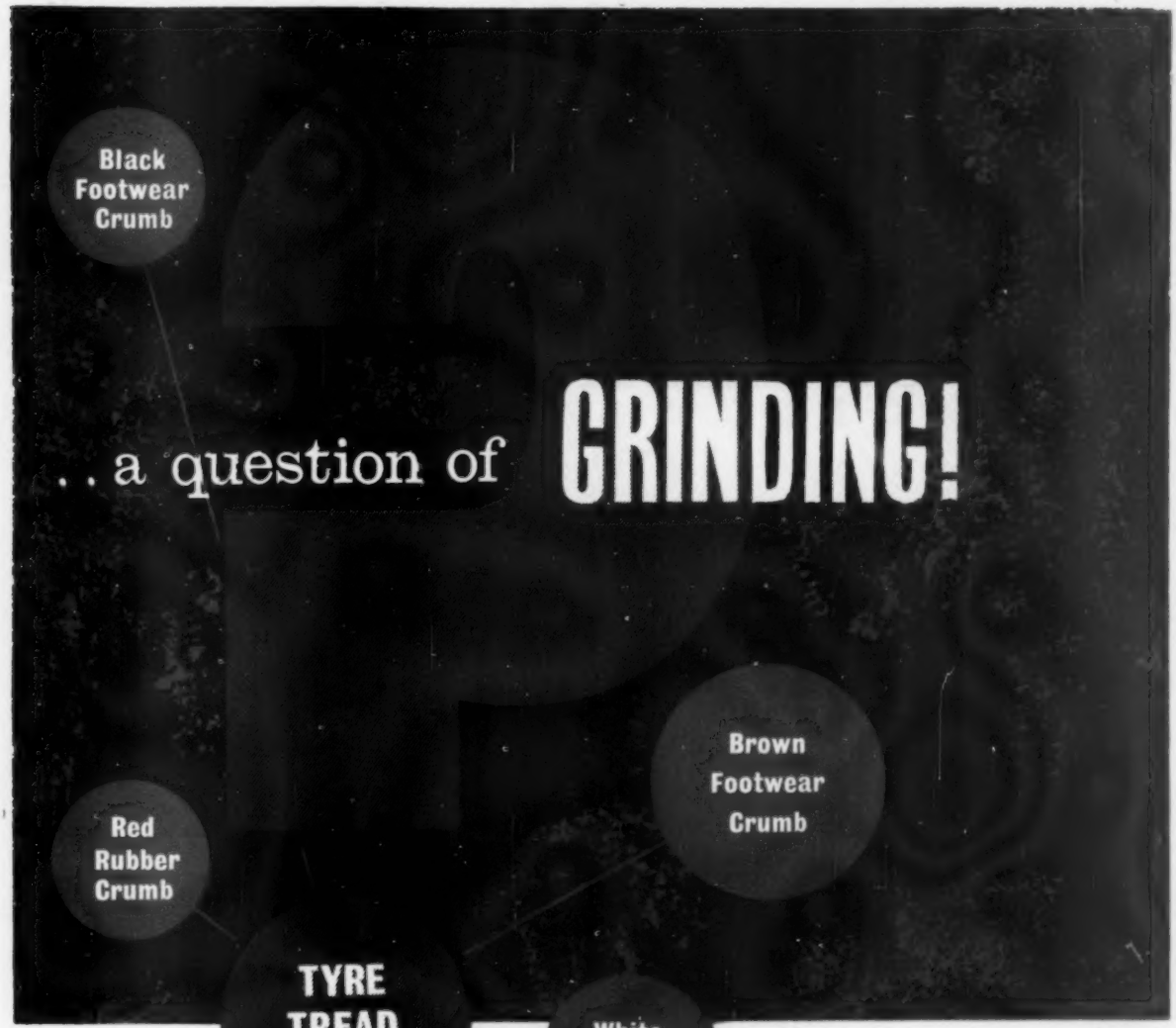

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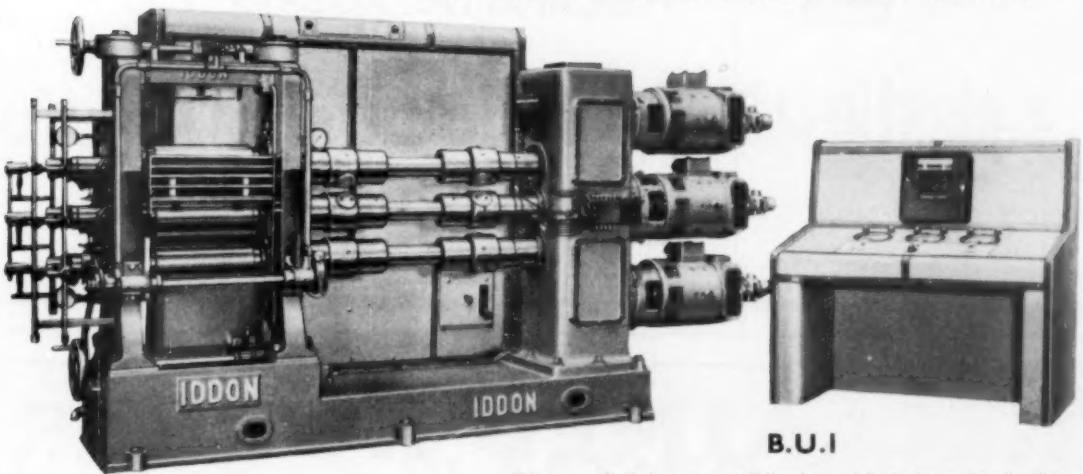

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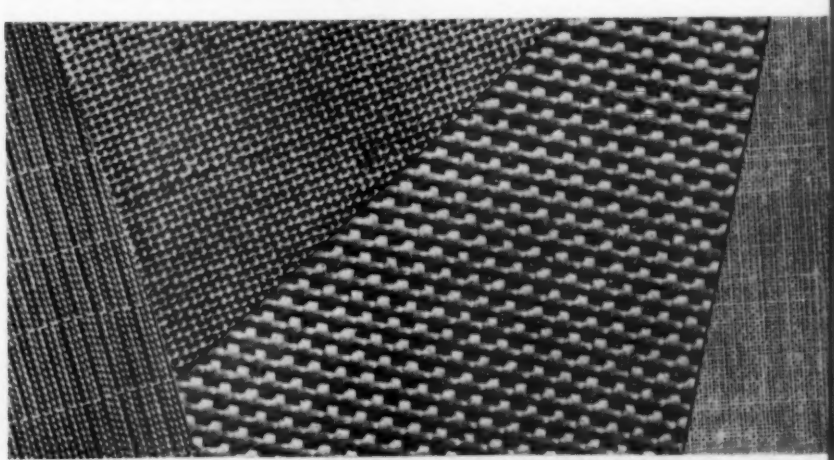

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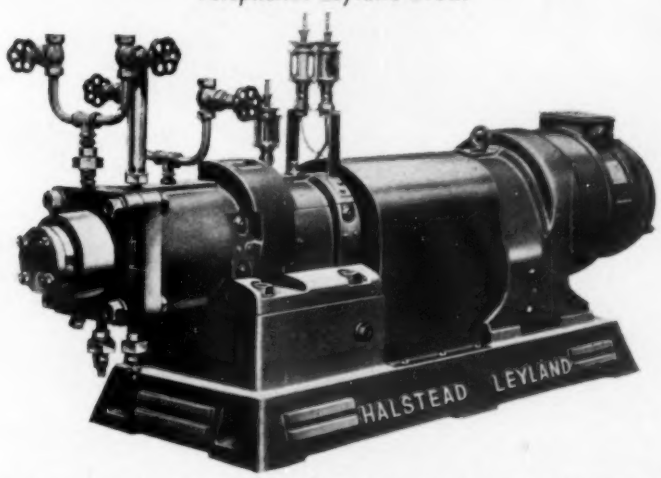

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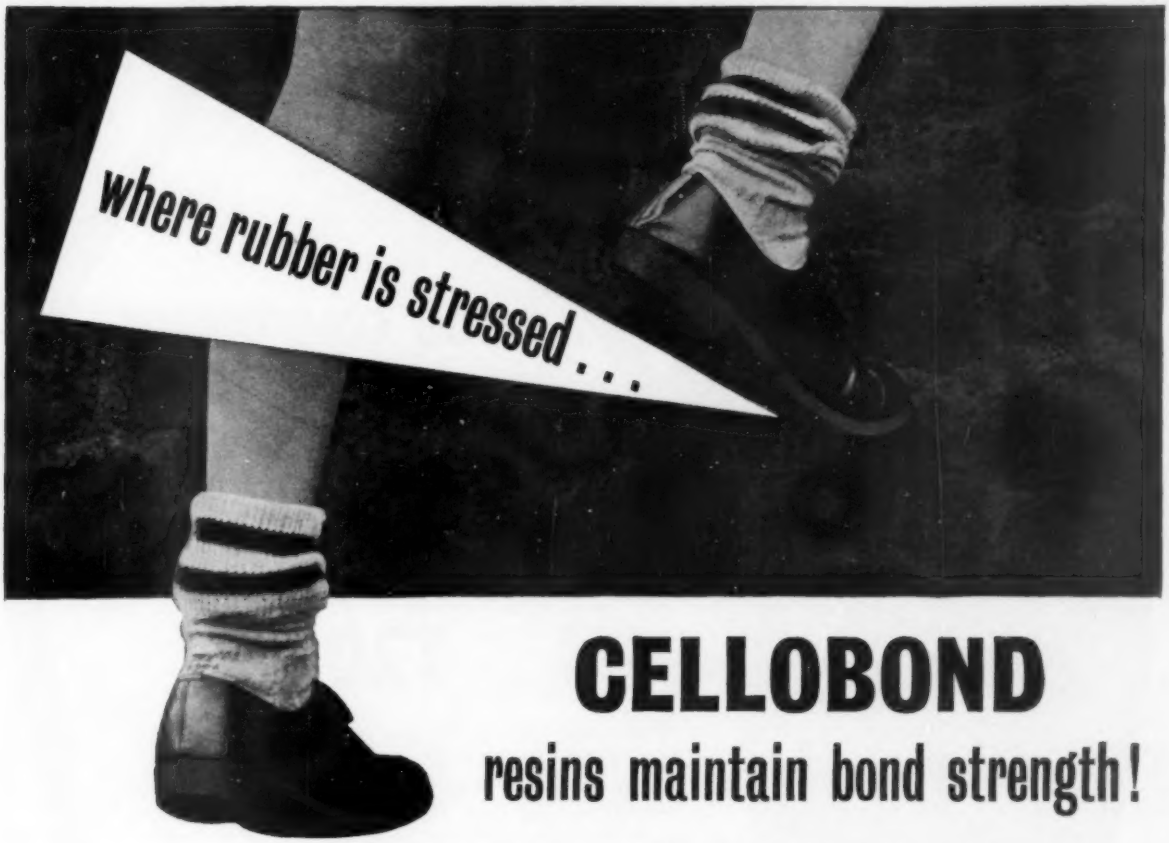

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IN ITS 76th YEAR

May 21 1960

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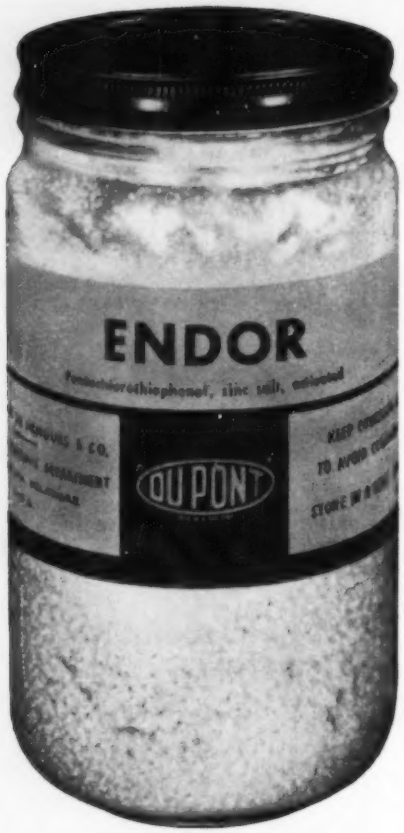

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NOTES of the WEEK

Dr Philip Schidrowitz

IT is with very real regret that we announce, on the page that has been his own for 40 years, the death of Dr Philip Schidrowitz. In his lifetime he achieved world-wide fame within the rubber industry for his contribution to the science and technology of rubber. His was, without doubt, one of the most remarkable careers in rubber, which he first started to study in 1904.

Most notable in all he did were his attributes of courage, vision and conscientiousness and it was these qualities, no less than his far-ranging grasp of the technology of the industry that brought requests for help and advice from all over the world. His work was many-sided. He was scientist, chemist, analyst, author and journalist. To that also can be added 'educationalist' for although he carried on until recently a thriving commercial practice—and, in fact, acted as consultant to a number of companies in this country and the United States until very shortly before his death—he devoted a great deal of time to the education of those in the industry.

There are many in the industry who remember another essential quality, that of kindness. He would go to endless trouble to help people without any thought of favour or reward. He used his great technical knowledge for the benefit of the industry. Nowhere was this more evident than in his weekly contribution to this Journal—Views and Reviews. This feature has been read and studied in most of the countries of the world. Part of its great value lay in the fact that it was not merely a collection of reviews but of views; the critical, constructive views of an expert with a singularly comprehensive grasp over the whole wide field. It was typical, too, that the tremendous spread of the field in recent years in no way daunted him. On the contrary, it stimulated an interest in rubber, and later plastics, that never flagged, appealing as it did to a mind that was ever alert and penetrating. It is no exaggeration to say that Dr Schidrowitz's contributions in Views and Reviews made it possible for people to get to know more about the subjects to which he directed attention than they could otherwise have done.

In spite of his age—and he had not been really fit for some months—he always made light of somewhat failing health, and was anxious that no one would think he was, as he phrased it, 'cracking up'. In fact, to the end, he kept up the astonishing range of reading journals from all over the world and in several languages, which enabled him to select the latest and most valuable items for inclusion in the Journal.

His sense of humour, too, never deserted him and for that, at least, as well as his unfailing patience and kindness, we on this Journal will remember him.

It is, perhaps, sad that Dr Schidrowitz missed by one week the completion of 40 years of Views and Reviews, for that is the period—if the feature had appeared this week—over which he had unfailingly written for *RJIP*.

It was typical of the man — illustrating at once his attitude to life, the force, energy and high ideals he brought to it and the endless fascination he found in it — that on the night before his death he was talking of his work and even planning his contribution to this week's issue of the Journal.

Mr Maudling's Humble Pie

THE most serious problem facing industry and the Government at the moment is that of European trade relations. The Six and the Seven are with us and have got to be treated as established facts until—as many businessmen hope—they can be added up to thirteen. The question that is at the front of everyone's mind now is—will there be some measure of working together, or will they drift apart? Mr Maudling said last week that such a separation would be a great tragedy. If this were to happen, he said, there would be a growing disruption of natural trade patterns, and a distortion and duplication of investment.

He sees no reason why the two groups should move apart, although he admits that difficult problems are posed by the existence or non-existence of a common tariff: the fundamental difference between the two groups. And he mentions our outstanding problem: the fact that we allow Commonwealth goods duty free entry. Naturally, any agreement with the Common Market has got to take this into account—and yet Mr Maudling seems to want to have his cake and eat it. He wants differences between the Six and the Seven to vanish completely, with the Commonwealth position remaining undisturbed. This sort of thinking might have been possible before the economic split in Europe; it hardly seems practical thinking now. It is only practical politics to admit what everyone knows: we had our chance of playing a leading part in a united Europe and we allowed it to slip through our fingers. The latest meeting of the Six has produced nothing. The ball is back in our court. The only thing we can do is to cut our losses and accept any solution we can get to the European tariff problem. Whatever the initial cost, we know that industrialists in rubber and plastics would be happier if Mr Maudling forgot about the cake and ate a piece of humble pie. Statistics published in this journal comparing UK trade with EEC and with EFTA show only too clearly the reason why.

NEWS *Briefs*

GOODYEAR MULTI-MILLION PLANT—PLASTICS FUTURE IN USA — INDIA TYRE STRIKE ENDS PERNIS TRIAL RUNS — PIRELLI IN GREECE

●**United States**—The US Department of Commerce on May 13 announced an easing of controls over exports of US goods to the Soviet Union and Eastern Europe. Some 250 commodities added to the general export list covered a wide variety of items, including rubber and rubber manufactures.

●**Greece**—The Pirelli Tyre Co. will finance and organize a $6m. rubber and tyre factory at Patras, on the west coast of Greece, it has been announced in Athens. The Greek Government first mentioned this in a statement on Greece's industrial development issued towards the end of February last (*RJIP* March 5). The factory capable of producing 240,000 tyres a year will be ready for production in 18 months and will save $5m. in foreign exchange every year. 90% of the total capital for the project will be provided by Pirelli and 10% by Greek interests. Some 500 workers will be employed.

●**United Kingdom** — Production at the India Tyre and Rubber Co.'s Inchinnan, Renfrewshire, factory was at a standstill last week with 1,000 workers out on strike. The company told the strikers that they had dismissed themselves by contravening their terms of employment. The strike began when the men disagreed with the company over procedure for dealing with local union requests and complaints. Latest reports indicate that an agreement has finally been reached between the company and TGWU officials.

●**Argentina**—Government agreement has recently been obtained for the setting up of a new polythene factory. Total consumption of plastics is expected to reach 30,000 tons this year. Capital investment is said to be about $17m.

●**Japan**—1959 production in Japan of vinyl plastics was 256,000 metric tons, urea and melamine 116,000 tons, phenolics 29,400 tons, polystyrene 20,185 tons, cellulose 15,800 tons, and polythene 3,400 tons.

●**United States**—Doubled production for the plastics industry in the USA was generally predicted with an annual production rate of about 11,000m. lb. by 1970 in the opinion of the Society of the Plastics Industry, holding their annual meeting in Miami. Building construction was cited as a great potential market. In the past 15 years polythene has been the most dynamic plastic material, with sales gaining 35 to 40% a year.

●**Brazil** — Licensing of a South American firm to make vinyl plastic foam by the 'Elastomer' process has been announced by Mr John E. Slaughter, jnr., president of Girdler Process Equipment Division of Chemetron Corporation. The new licensee is Vulcan Artefatos de Borracha SA, Rio de Janeiro. The agreement brings to 12 the number of companies in overseas countries licensed to produce vinyl foam by the 'Elastomer' process. In addition, three companies have been granted experimental licences.

●**United Kingdom** — The Goodyear Tyre and Rubber Co. (GB) Ltd. announce plans for the construction of a new ultra-modern office block at their Wolverhampton plant. Need for the new offices, Goodyear says, has been created by the expansion of business and the subsequent increase in personnel.

●**United States**—An electronic computer soon will take over the job of controlling manufacturing at what is claimed to be the world's largest synthetic rubber plant, in Houston, Texas, Mr Sam Dupree, vice-president in charge of production for Goodyear Tire and Rubber has disclosed. The computer, with the aid of electronic measuring devices, will immediately spot and correct changes in the processing factors as the material flows through the complicated system of pipes and reactors.

●**West Germany**—Tyre production in March achieved a new high with 21,580 tons, according to the Federal Bureau of Statistics. Output of other hard and soft rubber goods during March amounted to 25,936 tons, against 23,327 tons in February and to 71,007 tons in the first three months of this year, against 52,784 tons in the corresponding 1959 period.

●**United States**—The Goodyear Tyre and Rubber Co. announced on May 17 in Akron that it will build a new multi - million dollar plant in Beaumont, Texas, for the production of two synthetic 'natural' type rubbers. Synthetics to be made at the new factory are Natsyn and Budene. To date, they have been made in limited quantities in pilot plants in Akron. Industry circles said the plant would cost more than $20m.

●**Holland** — Trial runs are now under way at the Shell 60,000 ton SBR plant at Pernis, Rotterdam. The plant is to be officially opened on June 24 by Prince Bernhard of the Netherlands.

'Nip round and give 'em a drop of water!'—485

In 20 countries the name INTOL is now well known for top-quality SB Rubbers that are delivered on time. INTOL is the product of International Synthetic Rubber Co. Ltd. It comes from the world's newest and most modern synthetic rubber plant near Southampton, which came on stream in the latter part of 1958. Since then this unit has been in 24-hour production of rubbers and latices delivering from stock, *on time*, to a fast-growing list of home and overseas users.

INTOL rubbers offer you these advantages: Top, consistent quality in a wide range of rubbers—now to include high-solid latices · Firm delivery dates · Able, comprehensive technical service to assist you with rubber problems *Stable* price.

Eight grades of solid rubber —Intol 1500—1502—1509—1570 —1710—1712—1778—1006, and four latices are available for all types of applications including tyres—footwear—cables—belting—proofings —flooring—sporting goods etc.

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B2

Neoprene Production Starts in Northern Ireland

FIRST commercial production of neoprene synthetic rubber in the UK has started at Du Pont's Maydown works, John C. Weyrich, works general manager, announced in Londonderry on May 12.

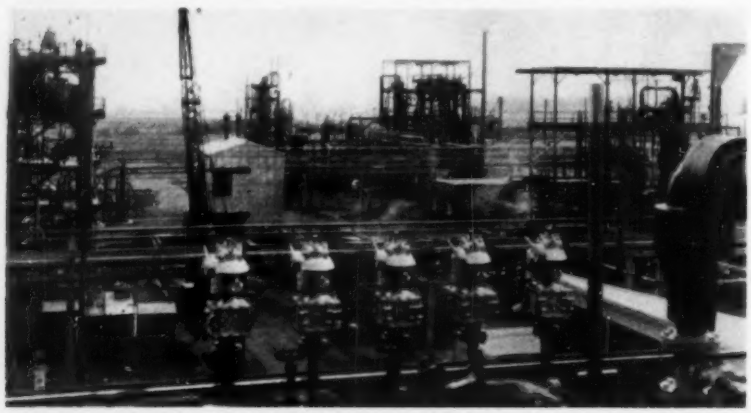
'The first pounds of neoprene to come off the production line this morning mark the beginning of our operations,' said Mr Weyrich. 'We will shortly be able to supply the growing demands not only of the UK, but also those of Western European and Commonwealth countries as well.'

The works is owned and operated by Du Pont (UK) and is located on a 365-acre site at Maydown, near Londonderry on Lough Foyle. It is designed to produce the various types of neoprene synthetic rubber and neoprene latex in greatest demand for a variety of end-products. First neoprene to be produced was type W, and is said to have reached a very good standard. Eventually types WHV, WX, WRT, GN, GNA, GRT and AD will be produced together with the various neoprene latices.

Latest Machinery

Maydown consists of four major production areas, including facilities for the manufacture of nitrogen, hydrogen, hydrogen chloride and other chemicals necessary for the polymerization process. There are eight main buildings comprising an administration building, canteen, engineering shops, stores, change house, medical centre and a quality control laboratory. The works is said to be equipped with the latest type of machinery 95% of which was purchased in the UK, the rest in Western Europe and the US.

Building of the works began in January 1958, and at the peak period of construction about 1,200 people were employed. Design and engineering consultation was furnished by the parent company. It is expected to employ about 400 people.



Monomer area of Du Pont's Maydown works, photographed from the top of the Polymer Building

Polypropylene Price Cut

Shell Chemical have announced reductions in the prices of their 'Carlona' polypropylene of 4d. a lb. The new price list also quotes for the first time prices for quantities of five tons and over.

New prices are: Less than ½ ton, 3s. 8d. per lb. natural; 4s. 2d. per lb. standard colours. ½ ton to five tons, 3s. 5d. per lb. natural; 3s. 11d. per lb. standard colours. Five tons and over, 3s. 4½d. per lb. natural; 3s. 10½d. per lb. standard colours.

REMOULD FACTORY PLANNED

Following discussions between the Lancashire and Merseyside Industrial Development Association and Davies Tyre, a tyre-remoulding factory and main distribution centre for the company is to be erected at Kirkby, near Liverpool.

Announcing this, Mr L. G. Hamilton, chairman of Davies Tyre, said that a five acre site had been bought and a 62,000 sq. ft. factory would be completed by the year-end. Employment would be provided for 200.

Thai Rubber Planting

Thailand has a total of 2.5m. rai of land under rubber planting of which 2.1m. rai are in the south (one rai equals 1,600 sq. yd.), according to the Ministry of Agriculture. Some 75% of the rubber estates are owned by Thai nationals and the remainder by aliens. The Thai nationals are mostly smallholders while the foreign nationals run the big estates, the Ministry sources added.

New Laminates

Decorative polyester/glass laminates, available in flexible as well as rigid form, are being marketed by Lancashire Fibre Glass Mouldings Ltd. under the trade name 'Formi-Stika.' They consist of printed cloths, backed by glass fibre and impregnated with a British Resin Product's Cellobond polyester resin.

Laminates can be supplied with an adhesive backing which provides an immediate bond between the laminate and undersurface. The surface abrasion resistance of the sheet is said to compare favourably with that of paper decorative laminates. It will shortly be available in continuous sheet form. Main outlet is expected to be the furniture trade.

Malayan Rubber Exchange

COMMITTEE TO EXAMINE FORMATION

THE Malayan Government announced today the formation of a 16-man committee to discuss the formation of a Rubber Exchange in Malaya. The committee is made up of five Government officials from the Commerce and Finance Ministries as well as the Controller of Customs Department. The 11 others come from European, Chinese and Malayan planting and rubber trading groups.

A Government statement said the committee would be asked to examine in detail what form of market organization and legislation is most desirable and submit its report to the Minister of Commerce and Industry.

The bulk of trading in Malayan Rubber is done in Singapore, to the south. Government officials said they were hopeful that the Rubber Exchange could begin business before the end of 1960.

Mr C. E. Goodrich has been appointed a director of Sungei Siput Rubber Plantations and Rini (Malaya) Rubber Estates.

Plastics in Cables

PART 4: PROCESSING OF THERMOPLASTICS

(Continued from May 14 issue, page 726)

By W. S. PENN, B.Sc.

BY far the most important process in the cable industry, particularly with plastics, is extrusion. All but a small percentage of the PVC and polythene used is processed by this method which therefore warrants and has received considerable study. The process of extrusion applied to PVC and polythene in particular, but also to other thermoplastics, is considered in the present article.

Processes other than extrusion may be dismissed quickly. In the manufacture of paper cables it is necessary to protect the metallic armour or sheathing from corrosion, normally when it is buried in the ground. A common method here is to use a composite system of various hessian tapes and compounds, but including two thin tapes of PVC (0.004in. to 0.006in. thick).

Vinyl lacquers are used to some extent in the cable industry. These are normally applied by a dipping and drying process similar to the conventional techniques for cellulose acetate. An extremely attractive finish can be made with a suitable PVC provided the correct gelling conditions are employed.

There are a number of subsidiary processes in the cable industry apart from extrusion itself. It is frequently necessary to print or mark the cables in some other way, and it is also necessary to apply a coloured line to the cores spirally, as a means of further identification.

General Extrusion Procedure

When PVC and polythene were first introduced into the cable industry only conventional rubber equipment was available. This meant that the extruders only had a low length/diameter ratio probably in the order of 4:1. Moreover, the flights would be comparatively deep. Since this was the only type of extruder available it was converted to make it suitable for use with PVC, by the simple expedient of providing additional heating facilities, and a few companies do in fact still use extruders of this type.

Such extruders had definite limitations: they could not be used for the high speed precision work which is now required, nor could they be used for blending masterbatches together so that a completely compounded stock had to be used. For this purpose the compound needed to be fed from hot mill rolls.

The developments which have taken place since the early days have produced an extruder which is suitable for production of cables to fine limits and at high speeds. Most of these extruders have certain features in common. They have a high length/diameter ratio and a shallow flight which means the efficient working of the materials introduced into the hopper. The extruders usually have graded heating operated from a central control panel. There are at least three heating zones on the barrel, one on the head and one on the die. (In the case of polythene it may be possible to eliminate one of the last two because of its special flow characteristics.) Just as important as the heating, are the cooling arrangements. Normally water can be passed through the scroll and the feed end of the barrel, while frequently additional cooling from air jets is available for the full length of the barrel. In the cable industry it is normal to employ cross-head extruders so that the thermoplastic has to travel through a right-angle bend to be applied to the wire.

A reel of conductor is usually loaded into a let-off stand, but the disadvantage of this method is that only a limited amount of conductor can be stored on the reel, so that continuous methods of supplying conductor have been devised. The wire then passes through a tensioning device to equalize the varying tensions of the system, from where it may pass between electrodes (so that a current can be passed through to heat the wire up) and through straightening devices (in the case of the larger conductors) before it enters the point in the extruder head.

The plastic is fed into the hopper where care should be taken to avoid 'bridging' which will cause breaks in extrusion. Usually a tumbled mixture of masterbatches is used particularly for PVC and polythene. The plastic is extruded on to the wire and on emerging from the die is almost immediately passed into a cooling trough to chill the material as quickly as possible so that subsequent distortion will not take place. After this the surplus water is removed quickly by air jets when the covered conductor (the core) passes through another tensioning device after which it is reeled up automatically. Various types of gauges are employed to measure diameter and these are preferably coupled with the extruder motor so that the diameter can be automatically controlled. This is accomplished by increasing or decreasing speed of extrusion. Eccentricity gauges may be employed in a similar manner.

The speeds used vary considerably according to the size of the wire. With a small wire of say 0.024in. diameter on to which is extruded 0.008in. of PVC or polythene, extrusion speeds of 1,200ft./min. are common. However, urgent experiments are being carried out to reach speeds of up to 2,000ft./min.

The Modern Scroll

A common type of scroll at the present time has a single start and a high length/diameter ratio of 15:1. In the case of PVC there is usually a constant pitch with decreasing depth of flight from about 0.4in. to 0.2in. In the case of polythene and similar materials the depth of flight will be reduced to 0.1in. and in some cases changes from 0.2in. to 0.1in. along the scroll.

The size of the clearance between the screw and barrel is of the greatest importance. Figure 6 shows a typical relationship between output and the clearance. It will be seen that after little change for the first few thousandths of an inch there is a rapid decrease in output.

Points and Dies

The points and dies employed in the plastics side of the cable industry are similar to those used for rubber and associated material. Figure 7 illustrates two common types of points and dies used in the cable industry for plastics. The first type may be termed a filling type because when a laid up cable, having large interstices between the cores, passes through it, this set-up enables the interstices to be filled. The second type of point and die is the tubing type used for a variety of purposes. Perhaps the most important application is in PVC mains cables. In these types the larger sizes of conductor are sector

shaped instead of being circular. Since these are pre-twisted the apices of the conductor are continually changing their position relative to the die. This means that a circular die has to be employed and the extrusion pulled down by vacuum on to the conductor. Another reason for using the tubing point and die is guaranteed concentricity of the applied insulation. It will be seen that if a tube of constant dimensions is extruded and pulled down by vacuum on to the cable beneath then the thickness of the cable sheath must be constant. Whereas where the cable on to which the sheath is to be extruded varies somewhat in shape, the use of a normal point and die would cause considerable eccentricity. The technique is also sometimes employed for high speed extrusions.

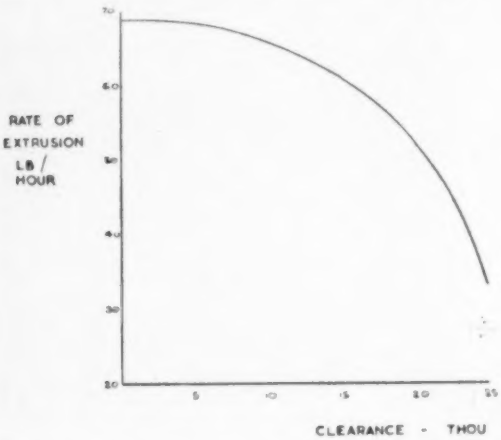


Fig. 6. Relation of output to scroll clearance. 2½-in. scroll

The points and dies are usually self-centring. This means that they cannot be moved with respect to each other, as they can in the older extruders, but are fixed rigidly in position.

The design of point and die is clearly of great importance although there are still no scientific rules on the subject. There are several aspects to be considered, first the angle between the faces of the point and die. As the angle is increased the set-up tends more and more towards the 'filling' variety so that the larger interstices of the cable to be filled the wider the angle should be. At the same time, the eccentricity increases so that it is usually necessary to strike a compromise. Conversely, as the angle is reduced a more 'tubing' type of set-up is obtained and any tendency of the sheath to stick to the cores is reduced.

The land fulfils a reasonably important function in die design. In theory a reasonably long land is required on the die to polish the surface of the material and to compact it adequate flow around the whole of the point can be obtained. As far as the size of the die is concerned it is not usual to have a very large pull-down, and the difference in the diameter of the extruded section of the die should not be more than about 0.010in.

Figures of 0.25in. have been employed but the smaller the land the better the centre, and in practice a perfectly satisfactory finish can be obtained with a short land provided the temperature is high enough. A third feature of the design is the distance between the tip of the point and die. In the case of plastics, little additional advantage is gained in varying this distance and a gap of 0.25in. is adequate for most purposes.

In the case of rubber cables it is usually necessary to employ what is known as 'compensation' of the point. This is because of the crosshead type of extruder, so that the part of the point and die furthest away from the end of the screw tends to be starved of material. It is not necessary in most cases to have this type of compensation for plastics presumably since the material is so fluid and the pressure is so great that

Fig. 7. Points and dies for plastics extrusions. (*Left*) Tubing point and die; (*right*) standard point and die

Screens

Although the use of screens has not attained a very prominent position in the case of the extrusion of elastomers, the situation is quite different with thermoplastics. Screens should always be employed for various reasons. There is, of course, the obvious one of removing any foreign particles and with thin wall extrusions this is most important. More important, however, assuming that the material is reasonably clean, is to use the screens to help correctly plasticize the material and build up adequate extrusion pressure. This results in a greatly improved appearance, and in the case of hard grade PVC's it is impossible to obtain suitable extrusions without adequate screening.

Table 1 gives a list of some screens which have been employed for typical extrusions. There is no way of saying that these are theoretically correct but they have been found to give satisfactory results. Usually one more or less makes little difference but an extra screen will frequently help a variety of extrusion problems. General purpose PVC insulation and sheathing normally requires far less screens than hard grade PVC and polythene or nylon.

TABLE 1
SCREENS FOR PLASTICS

Machine	Material	Screens (mesh)
2½ in.	GP. PVC insulation	3 × 60
	Hard grade PVC	3 × 120
		2 × 60
	Grade 2 polythene	6 × 60
	Nylon	4 × 60
3½ in.	GP. PVC insulation	2 × 60
	Thin wall PVC extrusions	3 × 60
	Hard grade PVC Polythene, Gade 2 Nylon	3 × 60

Extruder Heating

The subject of the temperatures to apply to the various parts of the extruder is a difficult one. The usual recommendations involve a comparatively low temperature at the hopper increasing to comparatively high temperature at the die. This works perfectly well with extruders operating at low rpm and with short scrolls (as is frequently the case in the laboratory), but with modern machines and at high speeds many variations are likely to be introduced. Moreover, it is usually found in practice that the temperatures used on extruders is a question of obtaining a delicate balance between heating and cooling arrangements.

Table 2 gives details of some temperatures which have been em-

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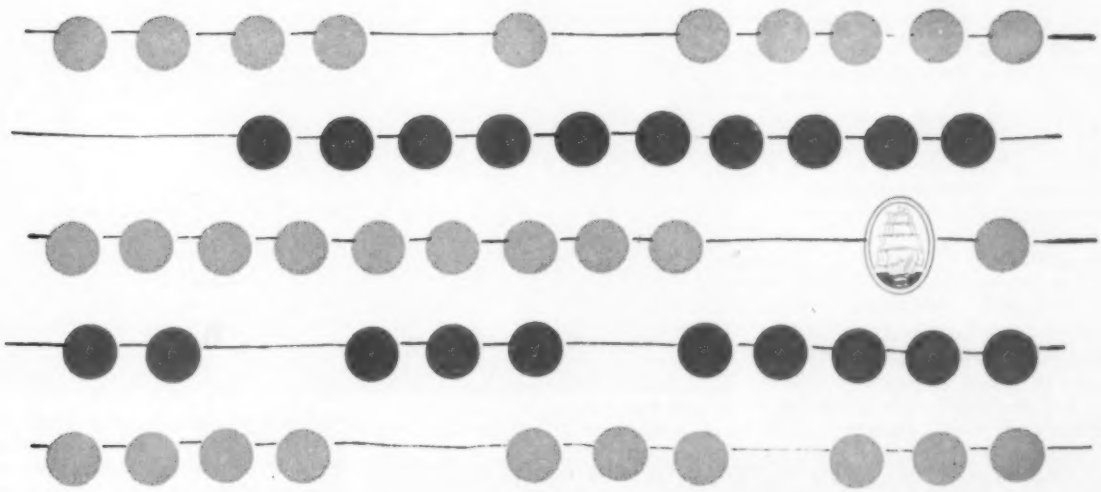

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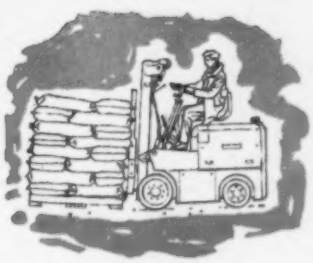

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ployed for certain materials. These were with modern types of extruder described above and at relatively high speeds. It will be seen that for the standard type of PVC the temperature is virtually constant throughout. In the case of the hard grade PVC the starting temperature is a little lower because of the extra heat generated during its plasticization. Only the die is at a high temperature to give the necessary finish. Where it is necessary to pass the heat shock test, additional heat is required both inside the extruder and by heating the wire before it goes into the extruder.

TABLE 2
EXTRUDER TEMPERATURE (°C.)
2½IN. MACHINE

Material	Barrel			Head	Die
	Feed End	Middle	Head End		
1. GP. PVC (B.S.2899)	150	150	160	150	150
2. Hard grade PVC	140	140	150	150	160
3. Hard grade PVC (for heat shock test)	140	150	150	200	220
4. Grade 2 polythene:					
Tubing	250	300	300	310	
Normal	270	310	325	320	
5. Nylon	280	320	330	320	
6. HD polythene	280	320	340	330	
7. Polypropylene	280	320	340	330	

With those materials having a fairly sharp melting point which includes all grades of polythene, nylon and polypropylene, much higher temperatures are used. Moreover, it is not usual to employ cooling water on the scroll as with PVC extrusions. The head is also very small since a molten material is passing through it and the heat capacity of the set-up need not be as great as with PVC.

Table 3 gives some temperatures which have been used on a larger machine and for different sizes of conductor. With the large extrusion it will be seen that the more normal type of heating arrangement is permissible since rpm are low and the slow passage of the plastic through the extruder gives plenty of time for it to be heated. With a moderate size extrusion more heat is required and the temperatures have been increased. With small wires the rate of extrusion is great and a lot of heat is required quickly so that high temperatures are used throughout.

The heating arrangements discussed above logically bring up the subject of adiabatic heating which is probably quite normal with most modern extruders. It means in fact that once the machine has been warmed up by external heating and a start has been made with the extrusion of the plastic (principally with PVC) then the heaters can be switched off. The plasticization of the PVC develops considerable heat which is quite sufficient for satisfactory extrusion. This statement applies more to the barrel of the extruder and it is normal to keep the heaters on at the head and die. Usually the problem with PVC is not to provide sufficient heat but to keep the system adequately cool.

Great caution should be taken in interpreting the temperatures given by automatic equipment. Sometimes extrusion difficulties occur which indicate that the plastic is being overheated, but the temperature recorders indicate that this is not so. In actual practice, one of two things can have happened (a) the thermostatic control can have gone wrong and (b) the recording instruments are such that the indicator needle cannot rise more than a few degrees above the temperature at which the thermostat has been set. If the restriction is removed it will frequently be found that the temperature recorded will rise 20-30°C. above that at which it was set.

In the case of (a) above this is not the usual cause of over-heating trouble. If the thermostat does break down and allow unrestricted heating at a point, the plastic is de-polymerized and degraded, frequently to the point of carbonization. Such a problem is a question for the electricians. In the case of (b) however, the situation is quite different and is very common. The only answer is to switch all the heat off and to apply cooling until a reasonable temperature is reached. In many cases, it is advisable to set the initial temperatures rather lower than those theoretically required so that with the heat developed by the PVC itself a reasonable balance will be achieved.

TABLE 3
TEMPERATURES (°C.) FOR DIFFERENT EXTRUSIONS (PVC)
3½IN. MACHINE

Size	Barrel			Head	Die
	Feed End	Middle	Head End		
Small wires (1/.024in.)	300	300	300	300	300
Normal wires (7/.029in.)	150	150	150	160	160
Large wires (37/.083in.)	110	120	130	130	150

The recommendation given above about setting the extruder at a lower temperature than normal may give rise to certain difficulties. The principal difficulty is that at the start of the extrusion cold PVC chips are added to the extruder and with the low temperatures this is likely to place undue strain on the extruder motor. The answer to this problem is to add a relatively small amount of PVC at a time so that the screw has a chance to work on it and develop some heat. In other words, the screw should not be filled with an open hopper right at the start of the extrusion. In actual practice, a schedule of operations can easily be laid down to guide the operator.

It is not claimed that the above information is theoretically correct (if indeed theories on the subject can be devised), or that the conditions are common to all users of high speed modern extruders. Nevertheless, it is likely that the information given represents the experience of many users.

Some of the details given are contrary to the instructions provided by suppliers of raw materials. For example, it is generally conceded that the feed end of the barrel should be kept cool. For some materials this just does not give adequate plasticization quickly enough, particularly in high speed extrusion.

In starting with a new extruder and/or a new material it will be necessary to find the heat levels by process of trial and error. In doing this it should be appreciated that an increase or decrease in temperature may achieve the desired results. However, these comments rarely apply to the die where the heat can be regulated independently to give the best finish.

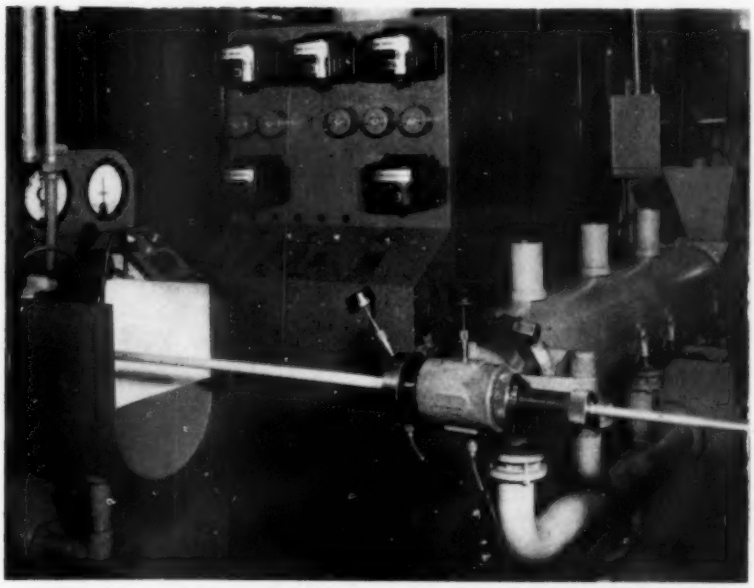
Eccentricity

One of the biggest problems with any material when working at high speeds is to extrude a concentric tube around the wire. Although it has been stated that no compensation is necessary on the point, it can readily be seen that at high rpm there will be a tendency for the wire to be displaced within the point. There is not one answer to the problem of eccentricity, but the following factors should be kept in mind.

In the first place, it is a rule that the higher the speed the worse the eccentricity and as it will obviously be desirable to work at as high a speed as possible the question of eccentricity will frequently decide the maximum speed at which an extruder

can be run. If eccentricity troubles are being experienced and all else fails then a reduction in speed will give a considerable improvement.

The temperature of the plastic is obviously of considerable importance.



Johnson and Phillips

Fig. 8. Control panel and heating units of modern PVC extruder

An improvement might be effected by its variation up or down and there is no general rule which can be given. However, coupled with this is the question of screens and a variation in the number used may also affect the eccentricity a great deal. Clearly the design of the point and die has a considerable bearing on the problem. This aspect has already been considered, but it should be stressed that a variation in the size of the die, the land or the gap between the point and die, or the angle between them will affect eccentricity. The final answer will be a combination of the conditions described and it will be found with experience that many of the variables can be eliminated so that the amount of experimentation for any given set-up can be reduced to a minimum.

If it proves impossible by any of the above variations to achieve concentricity then the solution must be found by another method. This has already been considered and involves extruding a tube bigger than the wire and drawing it down by vacuum on to the wire. This technique will work at quite high speeds.

Other Processes

PVC cables can be printed either cold (after manufacture) or during the actual extrusion process. In either case a special PVC ink polymer is used, plasticized, and pigmented to give a suitable opacity. If the printing is carried out in the cold it is unlikely to be indelible and may frequently be rubbed off. It is preferable to print at the extruder.

Johnson and Phillips

Fig. 9. Diameter control of PVC cables

In printing at the extruder there are two important points to be considered. The first is the distance of the printing wheel away from the die, and this can only be judged by experience. It must not be so close that the printing wheel warms up because of its contact with the hot PVC, and thus dries the ink too quickly, clogging the wheel. If it is too close the wheel is also likely to mark the surface of the PVC. On the other hand, if it is too far away, smudging is likely to occur and the ink will not bond to the surface of the PVC. The usual distance is about 2ft. ± 6in.

The second point concerning printing is the type of wheel to be used. Raised type is quite unsuitable and is quickly clogged. Engraved wheels must be used and the best depth of the engraving must be found by trial and error. Chromium plated wheels should be employed and a scraper used to remove surplus ink which will not damage the chromium plating. A nylon scraper would be suitable.

Some of the above comments apply to the indentation of PVC or polythene. Obviously raised type must be employed in this instance and the most important factor is the distance of the wheel away from the point and die. The shape of the wheel may also be important and may have to be curved on smaller cables. Embossing, using similar principles, is also practised with indented, and sometimes curved wheels.

An important process with PVC cores is that of applying subsidiary identification to the cores. In a cable which may have a hundred or more cores it is necessary to have positive identification for each one. Usually only the 13 basic colours given in BS2746 are used for the colour of the insulation and further identification is obtained by spiralling stripes of coloured PVC inks on to

Continued on page 782

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IRI FOUNDATION LECTURE 1960

High Polymers: The Story of an Age in Principle and Practice

(Summary of the Lecture delivered by Maldwyn Jones in Manchester on May 20)

THE building up of large long chain molecules is the basis of three very large industries, namely rubbers, plastics, and synthetic fibres. Although the largest of these is the plastics industry it was probably the intense effort that went into the problem of producing synthetic rubber which made the biggest contribution to the development of the whole concept of polymerization. Although the production of polymers, when considered on a weight basis, is small compared to that of conventional materials such as metals, on a volume basis it is by no means insignificant especially when the rate at which the industry has developed is considered. Another feature of the place occupied by synthetic materials in the economic structure, is that while the cost of living has been rising the price of polymers has fallen steadily. Polymeric materials are finding application in almost every field of human activity, from building and transport to surgery and clothing.

History of Polymerization

The first attempts were to deduce the structure of natural rubber, and the relationship between the rubber molecule and that of isoprene was recognized almost 100 years ago. Early in the present century however, emphasis changed from attempts to elucidate a structure, to attempts to achieve by synthetic means the desirable properties which that structure appeared to provide and much progress in the fields of synthetic rubbers was made with diolefines and polyisoprene. The 1930's were notable because of a big step forward in theoretical conceptions and by the appearance of many new polymers as materials of commerce—polythene, nylon, neoprene, polystyrene, polymethyl methacrylate and polyvinyl chloride—to name only a few. It was at this stage that the idea of a 'tailor made' molecule was prevalent although this description was not really justified until the post Ziegler and Natta developments in the synthetic rubber field. The outstanding name at this period, and still one of the greatest was that of Carrothers who was responsible for neoprene and nylon in the early '30s.

Ten years later further great advances had been made thanks to the free radical theory of polymerization. Progress was also being made with ionic polymerization systems (for example polyisobutene).

Later the discovery and development of block and graft polymerization were illustrations of further control of the reactions, and the next step forward was Ziegler's low pressure polymerization of ethylene, followed by Natta's development of Ziegler's ideas in finding selective catalyst systems, thus making possible a controlled three dimensional molecule.

The Physical Nature of High Polymers

The most important property of high polymers is that they can exhibit to a significant degree such mechanical properties as high strength and elasticity, toughness, pliability, hardness and resilience. The relative degree to which they possess these properties determines whether they can be classified as rubbers or plastics or whether they are fibre forming. There is no well defined dividing line between one type and another. The behaviour of high polymers whether they be rubbers, plastics or fibres depends on the length of the chain, and correspondingly on the average molecular weight, molecular weight distribution, the linearity of the chain, the degree of branching, the degree of cross-linking, and the actual spatial arrangement of the atoms or groups of atoms around the basic chain. Fortunately it is today possible to control most of these factors.

As an example of the way in which advances in technology have promoted the development of the new materials, the use of Ziegler and Natta's work has enabled a polymer of isoprene to be built up which is practically identical in structure to natural rubber and which has very similar properties. Cis-1:4 polybutadiene has also been made in a similar way and this also has properties closely allied to those of natural, and in fact is the first synthetic ever produced with resilience as good as natural.

The use of stereospecific catalysts has also been responsible for the successful production of polypropylene, which is another good example of the close relationship between chemical synthesis, elucidation of a physical structure and final technological exploitation.

No purely physical phenomenon associated with high polymers has had

Maldwyn Jones *studied chemistry at Victoria University, Manchester, graduating B.Sc. with honours. He then joined the Dunlop Rubber Co. in Birmingham until* 1930, *when he moved to the Rubber and Resins Service Department of I.C.I. Dyestuffs Division, of which he was soon afterwards appointed assistant manager. At this time he joined the IRI and was secretary of the Manchester section for six years, was awarded a fellowship in* 1940 *and has now served on the Council for about* 20 *years. In* 1944 *he was appointed assistant sales manager, I.C.I. Plastics Department, Southern Region, in* 1945 *joined I.C.I. Plastics Division as technical service and development manager and was appointed to the board in* 1957 *as development director. Mr. Jones was awarded the fellowship of the Plastics Institute this year.*

greater effect on ultimate performance than that of crystallization, which is the ability of the polymer chains to arrange themselves in an ordered manner. The actual degree of crystallinity may vary from a few to more than 90%, but never appears to reach 100%. Natural rubber is amorphous whereas nylon and terylene are normally highly crystalline, and this has a profound effect on the ability of the two latter to form fibres. This phenomenon is also of great importance in the process of making films, which after extrusion are stretched in two directions at right angles thus orientating the molecules and increasing the tensile strength of the film, which can then be heat treated to stabilize it in its stretched and strengthened form.

The density of a polymer has a direct effect on the properties of a fabricated article, an increase in density giving rise to a number of improvements, but having an adverse effect upon the toughness. The density of a polymer can be varied by deliberate alteration of the polymerization conditions, but the heat treatment during processing can also greatly effect the degree of crystallinity and thus the density.

Incorrect control of temperatures during and immediately after moulding can produce many undesirable faults all of which are not at once apparent but may only be manifested later during service.

Control of Polymerization

Some of the best examples are to be found in the field of polyvinyl chloride—one of the big three amongst plastics polymers, and used in virtually every process common to thermoplastics and analogous to those developed earlier for natural rubber. PVC is produced from the monomer in aqueous system, either by emulsion or granular polymerization. Both of these involve dispersal of the monomer and the catalyst by high speed stirring, and the exact process conditions can have a profound effect on the nature of the polymer particle.

Although there are obviously many ways in which the rubber industry is interested in high polymers it is perhaps those products in between conventional rubbers and conventional plastics that excite the greatest attention. Apart from purely physical agencies such as temperature and time it is possible to influence the rubber-like character of polymers by copolymerization plasticizing, chemical modification and physical blending. Of these the widest variation in rubber-like characteristics can be achieved by copolymerization, the effect of which is to disturb the regularity of the polymer structure, with a corresponding depression of melting and second order transition points and an increase in softness, flexibility and solubility.

During recent years there has been a growing interest in the highly expensive fluorine derivative polymers and in this field copolymerization has proved successful in improving the processability of these materials.

Copolymers produced from amorphous homopolymers usually display properties intermediate between them, but this is not the case when copolymers are made from monomers whose homopolymers are normally crystalline. An excellent example of this is ethylene and propylene, both of which are crystalline and produce rigid non-elastic thermoplastics, whereas a copolymer in the ratio of 60/40 is an interesting, amorphous, vulcanizable rubber similar to butyl and natural. Nylon offers further proof of the beneficial effects of copolymerization as both nylon 66 and 610 have high sharp melting points and similar properties, but are both very difficult to process. A copolymer can however be obtained which has all the advantages and is much easier to process than either homopolymer.

Chemical modifications of a basic polymer may also have beneficial effects as for example the chlorination and better still chlorsulphonation of polythene. Such substituted polythenes have outstanding resistance to sunlight and weathering.

Polymer Blending

Of all the areas where rubber and plastics meet, the field covered by mixtures of hard rigid plastics and soft flexible rubbers is the one most widely practiced today. Many examples of this technique are well known such as the addition of a little rubber to phenolic moulding powder to make it resistant to impact, or the blending of butadiene/styrene rubber with polystyrene to reduce brittleness —the so called high impact polystyrene. A more recent development is the use of blends of styrene/acrylonitrile resins with nitrile rubbers to produce a high impact high softening material. Blends of nitrile rubbers with PVC containing small amounts of PVC, although requiring careful processing, have exceptional ozone resistance, not an outstanding property of nitrile itself. There is however one drawback common to all the rubber/resin blends and this is a lowering of the ageing resistance, but despite this these blends have become of major importance. They are often unexpected in behaviour because they are usually heterogeneous systems with the rubber being dispersed in the resin phase.

The Future

It is of course extremely difficult to forecast what is likely to result from scientific research and development effort, and perhaps the best way of approaching the problem is to study the trend of past events and consider what lessons are to be learned. Why for instance have so many developments occurred in the last 30 years? It is difficult to unravel any set pattern, but it seems that very few polymers were the result of attempts to produce a material with given properties, but were rather the discoveries of people working in the field of chemistry, as the discovery of nylon and neoprene. Polythene was discovered by chemists of I.C.I. Ltd. working on the effect of high pressure on chemical reactions and when a white powder was produced its significance as a plastic was not at first realized. Zeigler's development of low pressure polymerization of ethylene was not the result of an attempt to solve a set problem. Terylene on the other hand was the result of a set programme of research in an attempt to fill in gaps in the work of Carrothers.

The effort required to produce commercial products from chemical curiosities has in the past been enormous, and tremendous resources are being used in the USA and Russia today far in excess of our effort, but this does not mean that we cannot make useful contributions to the developments which will undoubtedly come.

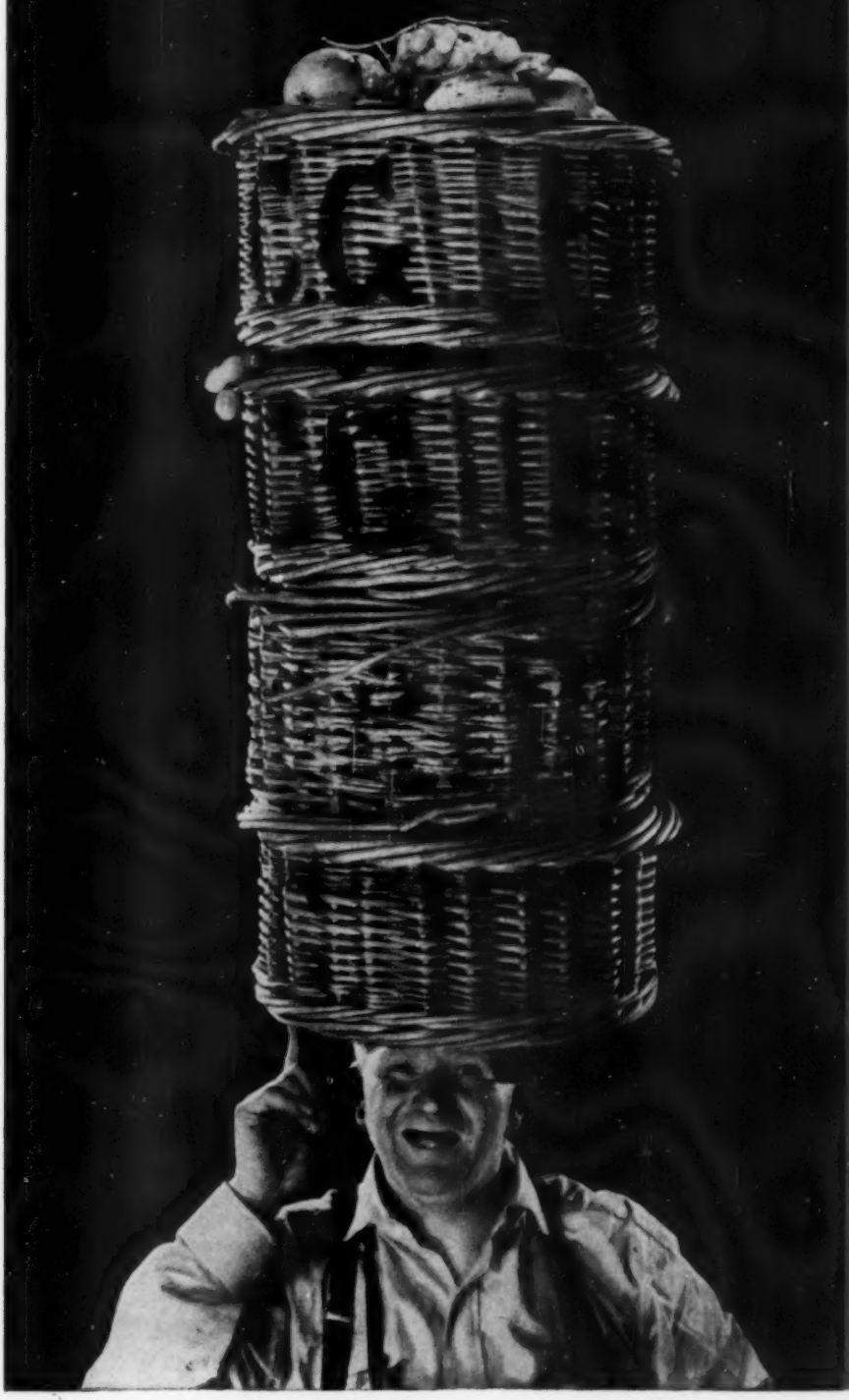
New products are continually being found and simultaneously theoretical knowledge and practical techniques are being improved, and there is no shortage of targets, as all high polymers as we know them have their shortcomings, and a polymer with the structural properties of steel or the cheapness and clarity of glass are worthy targets, while the greatest triumph of all would be a consumable or edible polymer—a market without saturation or end!

It is however outside the strict field of rubbers or plastics that the most fascinating work on polymers is being done, namely in the field of natural polymers.

Mr Michael Ewan-Smith, of Banstead, Surrey, has joined the Colston Group as sales manager of the recently merged Minibrix/Tallent Division.

MONSANTO HAS A WORD FOR IT

controlability...



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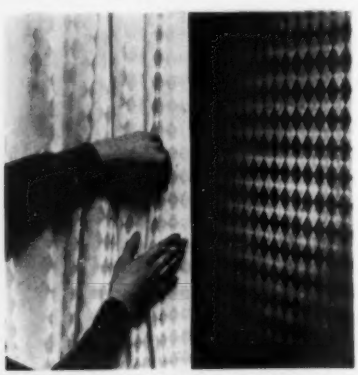
Melamine Plate and Vynide Win Design Centre Awards

TWO out of the 18 design centre awards for 1960 presented by the Duke of Edinburgh on Thursday went to plastics products. They were made by I.C.I. (Hyde) Ltd. and Brookes and Adam Ltd., of Birmingham.

I.C.I. won their award for their Vynide PVC coated fabric (V35 411), which is intended for wall covering rather than upholstery. It was designed by the company's design department, led by F. J. Hoswell, Des. R.C.A., and the judges commented that the pattern was a sophisticated one which looked particularly good in the white version; the unobtrusive pattern provided sufficient interest and texture to relieve a plain wall surface.

Fiesta. Melamine plate made by Brookes and Adams Ltd. Designed by Ronald E. Brookes, F.S.I.A.

A melamine plate—called Fiesta—won Brookes and Adam their award. Designed by Ronald E. Brookes, F.S.I.A., the plate is being made in seven colours: middy blue, light gunmetal, cardinal red, forest green, lime yellow, black and white. The judges liked the colours, and added that the shape was excellent and seemed particularly appropriate to the material used.



PVC coated fabric—Vynide V35411—by I.C.I. (Hyde) Ltd. Designed for use as a wall covering

The panel of judges, headed by Misha Black, O.B.E., were Mrs Jo Pattrick, Lady Casson, A.R.I.B.A., Hon.Des. R.C.A., J. Beresford-Evans, F.S.I.A., and F. H. K. Henrion, M.B.E. As before, they were asked to choose designs from any of those shown in the Design Centre during 1959, which, to their minds, were outstanding for originality, workmanship, economy or some other quality which made a real contribution in their industries.

Three other winners contained rubber and plastics. Office desk units made by Bath Cabinet Makers Ltd., have apron panels faced with white PVC cloth and legs are fitted with rubber shod castors. The new low-priced camera from Kodak—Brownie 44A—has a main moulding by Ekco in high impact polystyrene and a drip-dry furnishing case called 'Vision Net' makes, according to the judges 'an interesting use of a small amount of Terylene.'

IRI Golf

LONDON QUALIFIERS FOR WALLWORK CUP

THE London Section of the Institution of the Rubber Industry Golfing Society held a very successful meeting on May 5 at Porters Park Golf Club, Radlett, Herts. The main competition was the Captain's Prize; this was won by David Smith with a net score of 73 (92 – 19); second was Alec Loudon with 74 (81—7); third Arthur McCulloch with 74 (84 – 10).

This competition also served as the qualifying round of the Wallwork Cup which will be held at Aldeburgh from May 28-30. There were 36 entrants, and so there are 12 qualifiers from the London Section: C. D. L. Smith, A. Loudon, A. McCulloch, E. Ellery, L. V. Jennings, J. E. Pilbrow, J. I. Cunneen, R. McEwan, D. L. Langrish-Smith, J. F. E. Ruffell, A. J. Boyce and K. Valentine.

A four ball against bogey competition was also held, which was won by Eric Ellery and Arthur McCulloch, who returned the fine score of 6 up. Second were Tom Beazley and Len MacQueen (2 up).

What is said to be the world's largest and fastest aircraft tyre-testing machine, which will be equipped with an electrical system built by US General Electric, will be installed at the Akron, Ohio, plant of the General Tyre and Rubber Co. A 10ft. diameter steel road wheel will simulate landing and take-off conditions at speeds up to 350mph.

Utrecht Plastics Congress

Preceding the plastics exhibition 'macroPlastic 1960' to take place in Utrecht October 19 to 26, an international congress is to be held in Amsterdam. Under the title International Congress 1960 on the Technology of Plastics Processing, it is sponsored by the Association for the Advancement of the Knowledge of Materials, the Royal Institute of Engineers and the Royal Netherlands Chemical Federation, and will be held in the Koninklijk Instituut voor de Tropen, 63, Mauritskade, Amsterdam.

On the first two days, addresses are to be given by Dr J. Overhoff, manager of the Royal Dutch/Shell Plastics Laboratories at Delft, and Mr J. Butler, of British Industrial Plastics Ltd.

A provisional arrangement of section lectures is as follows:

Continuous processing: Extrusion; pipes, hose, profiles, monofilament, sheet and film (slit-extrusion), wire covering, film blowing, bottle blowing, coating. Calendering and spreading; film, sheet, supported film, etc. *Discontinuous processing:* Moulding; mouldings, sheets, etc. Injection moulding; moulds; compression and injection moulding. *Miscellaneous processing methods:* Thermoforming; manufacture of reinforced plastics; slush moulding, dipping, sintering processes, etc.; and plastics foam manufacture.

Mr G. B. C. Johnston has been appointed managing director of Wiggins Teape and Co.

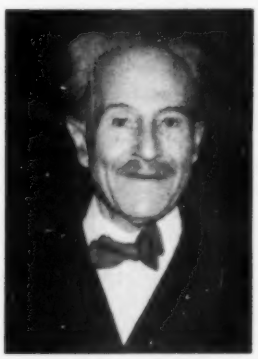
OBITUARY

Dr Philip Schidrowitz

author of

VIEWS *and* REVIEWS

PHILIP SCHIDROWITZ, Ph.D. (Berne), F.I.R.I., F.C.S. died at his Ealing home on Tuesday last, May 17, in his 88th year. He was educated at St. Charles College and University College School, London, and studied subsequently at the Federal Polytechnic, Zurich, and at the University of Berne.



Dr Schidrowitz first took up study of rubber chemistry and technology in 1904. Earlier, after a period as works chemist in the Midlands, he established a practice as consultant and analyst in Chancery Lane, London. Apart from rubber his earlier researches had to do with the chemistry and technology of distillation and brewing.

Among his first publications dealing with rubber research were papers on the viscosity of rubber solutions, on the particle in latex and the structure of crude rubber. There followed papers on the preparation and coagulation of latex and the application of latex, and publications concerning his researches in connexion with the vulcanization of rubber; the rubber stress-strain curve; plasticity and the testing and chemical examination of crude rubber. A number of these researches have been regarded as fundamental. Indeed, there were few spheres in connexion with the science and technology of rubber in which he did not display an interest.

As far back as 1914, among his other numerous achievements Dr Schidrowitz and Dr Goldsborough produced the first direct-from-latex sponge and patented the process. Other patents concerned the vulcanization of a wet coagulum—the first work on this subject. In the early 20's, Dr Schidrowitz found that latex could be vulcanized in the liquid state (Vultex process) and was also responsible, together with R. M. Ungar, for the development of softened rubber. With Dr C. A. Redfarn, he did a good deal of work in the field of modified rubbers including the development of expanded chlorinated rubber.

He was a consultant to a considerable number of important rubber manufacturing organizations in this country and the US, as well as to the Rubber Growers' Association and the British Rubber Producers' Research Association for whom he carried out various researches.

In 1911, he published his well known book *Rubber* which has been referred to often as a standard work. He was also author of the 'Rubber' article in Thorpe's *Dictionary of Applied Chemistry,* joint author with T. R. Dawson, of *Rubber Derivatives of Commercial Utility in Chemistry,* an American Chemical Society publication, and of major chapters, arising from his work on distillation, in the *Encyclopædia Britannica.*

Dr Schidrowitz was among the founder members of the Institution of the Rubber Industry and was last year made the first life vice-president of the Institution, whose Colwyn Gold Medal was awarded to him in 1940. In 1947 he gave the Institution's second Foundation Lecture, his subject being 'The Impact of Synthesis on the Rubber Industry.' He was a Fellow of the Chemical Society, a member of the Society of Public Analysts, a member of the Institute of Brewing and a member of the Society of Chemical Industry.

Phillip Schidrowitz was born in Germany on October 13 1872 and became a naturalized British subject well before the turn of the century. His parents later settled in the US. He married on June 1 1905 Ada Mary Gaine who survives him, as do his two sons, Peter Francis, a director of Latex Process and Dispersions Ltd., of Bury, Lancs., and Phillip Roger, who was a director of I.C.I. in Japan and is now with the Cyanamid Co. in that country.

The funeral took place at Golders Green Crematorium on May 19.

MEN *and* MATTERS

A Review of People and Events

by George A. Greenwood

AS a rule company meetings are inclined to be on the sober side if not downright dull, even when all the shareholders have to do is to accept a report and balance sheet recommending a final 20% dividend, and a generous bonus issue, or something like that. I gather, however, that the meeting the other day of Albright and Wilson, two or three incidents there proved the exception of the rule.

This was the first meeting since the merger with A. Boake Roberts Ltd., and one of the happy moments in the speech of Mr K. H. Wilson, presiding, was to welcome an old friend of theirs and ours, Mr F. G. Pentecost, to the board.

To the board, also, as a full-time director, came Sir Owen Wansborough-Jones, the distinguished scientist and former civil servant. The chairman said, no doubt in terms of what has happened in Whitehall during the past two or three years, that when that main prop of the Ministry of Supply was removed, the Ministry collapsed. This was promptly capped by a woman shareholder who wanted to know what special carrot Sir Owen liked which they might have cooked for him, so that he would not leave Albright and Wilson and cause *their* collapse!

There was, I am told, more laughter than one normally hears at meetings of this description.

Change-over at 54

Sir Owen is making a change in his career in the very height of it. Aged 54 now, an East Anglian and a bachelor, he is a science product of Trinity Hall, Cambridge, and one of the most brilliant students it has turned out in this century. He was for years a Fellow of his old College, a University demonstrator, and then went into the service of the nation at the beginning of the Second World War with an emergency commission which ended in his becoming the Ministry of Supply's chief scientist.

Incidentally, an elder brother is Major General Llewellyn Wansborough-Jones, who is Secretary General to the British Transport Commission and both of them are Companions of the Order of the Bath. Sir Owen was created a K.B.E. five years ago.

Another New Job

Within about a month of his retirement from the Board of Imperial Chemical Industries, with which he had been connected for 37 years, Mr J. L. S. Steel has been elected to the Board of Triplex Holdings, and appointed deputy chairman. Lincoln Steel, as most people know him, had already intimated to his friends that he would find life in retirement irksome, but it will not be irksome now. He is one of the most active men, mentally and physically. For some years he was responsible for I.C.I.'s economic planning, and latterly he was particularly concerned with the affairs of the European Common Market and the Free Trade Area.

More News of That Bottle

Further details of that 20-year-old hot water bottle, which I mentioned a fortnight ago, have now come to light. Following on the brief description which I printed comes a letter from Mr F. H. Puxty, chief chemist of the Greengate and Irwell Rubber Co. Ltd., of Salford, Manchester.

The bottle, says Mr Puxty, would appear to be one of his company's manufacture. Certainly it seems exactly to fit the description. Mr Puxty says that the bottles produced by his company in the old days were of stronger and stouter construction than most others then on the market —a fact which would explain quite naturally the long life which the one Mrs Chivers still uses has had, and the service it has rendered. Mr Puxty says they discontinued the production of this line just after the last war, as it was not possible to meet competition with this heavier construction.

W. S. FARRALL who was deputy to the late J. H. Jarman, has now been appointed chief engineer (sales) of Tufnol Ltd.

Dr Schidrowitz

On another page—the page which he filled regularly for nearly 40 years —you can read an appreciation of Dr Schidrowitz, who died on Tuesday. But naturally everyone connected with the industry wants to add a word about the man who was the first to put his signature on the paper agreeing to form the Institution of the Rubber Industry.

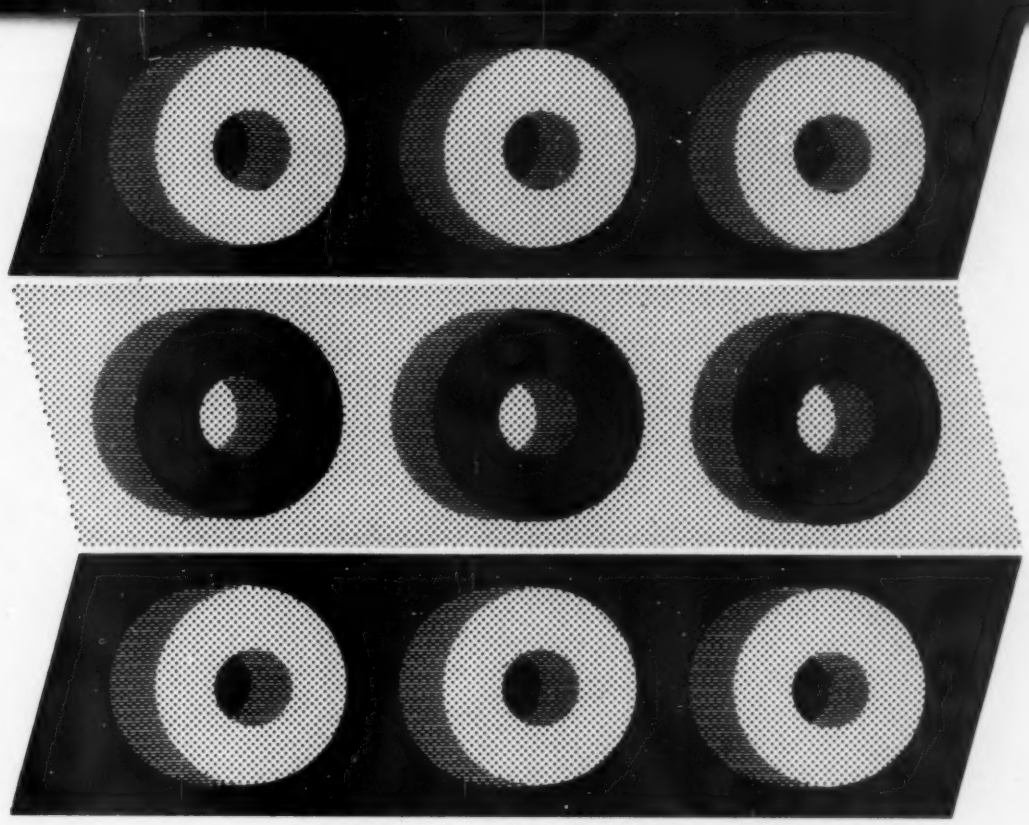
There were many sides to Dr Schidrowitz — technologist, chemist, educationalist, journalist—and they all seemed to meet in Views and Reviews, which was certainly one of the most widely read columns in any industry. One of the best stories I heard about the column was told by Dr Cotton, head of the National College. He said that in America he had often asked students: 'Have you read such and such a paper?' and they had replied: 'No . . . I can't say I have . . . but I've read Dr Schidrowitz's review.'

He was a kindly man, and his sharp active mind was not without glints of humour. At a luncheon given to celebrate a quarter of a century of writing for this journal he said that people may have heard the father's advice to his son: 'Neither give nor take offence, my son, but remember, if one or the other is necessary, it is more blessed to give than receive.'

'He will never be replaced' is an old cliche, but this is one case where it is really justified.

Hytex Parrty

According to Mrs Chris Parr, a Society I confess I never heard of—the Triskedekaphobia Society—gained more than 100 new members last week. These were the guests at the Hytex dinner and dance. When I tell you that it was held on Friday the 13th, you may begin to get some idea of the objects, or *raison d'être* of the organization. That fine word, which I won't write again for fear of mis-spelling means in fact fear of the number 13 and in particular of the 13th when it falls on a Friday. If any of the guests had any phobias about the number or the day, or both, I am sure that these are now forever



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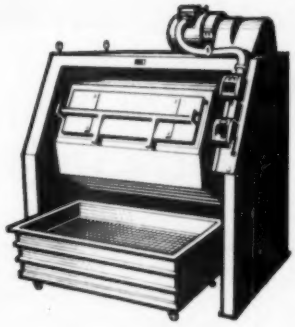

When small rubber components are frozen with 'Drikold'—I.C.I. solid carbon dioxide—in a rotating drum, flashes become brittle and break off with the tumbling action. Sub-zero de-flashing with 'Drikold' will increase production—for instance, complete multi-cavity mouldings can be tumbled to produce clean components efficiently and economically. I.C.I. Technical Service staff are available to advise on your problems, and will de-flash sample batches on request.

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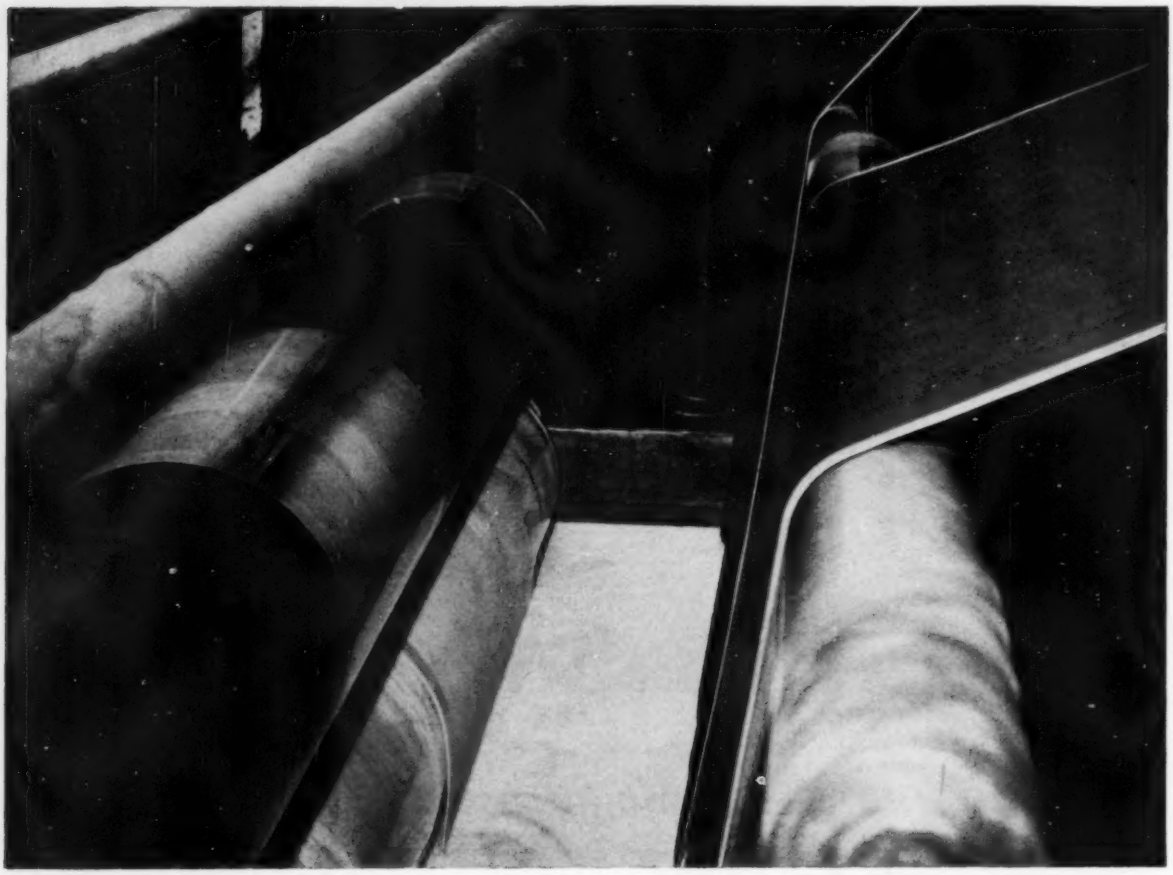

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dispelled. Chris and Dodie Parr were at the top of their form and the Parrty (please forgive me) was more successful than ever.

That Hammer Joke

For a smile, I reproduce without comment excepting a word of thanks, an interesting paragraph which appeared last week in the columns of *The Yorkshire Post*. It read as follows:—

'Apprentices who have been sent for the rubber hammer can now have the last laugh on the foreman in this age of plastics. They can fetch a 'Kralastic' hammer, a thermoplastic which is extremely rigid. It has been imported from the US under licence by I.C.I. Ltd., whose two-day exhibition 'Thermoplastics in Industry' opened yesterday in the Queen's Hotel, Leeds.'

North American Trip

Garth Swann, director of the British Recovered Rubber and Chemical Co. Ltd., Clayton, Manchester, and Alan Crook, secretary and buyer of the company, left this week for an extended 'buying and selling' tour of the US and Canada with a possible extension to the Far East.

Mr Crook left on Tuesday for Canada and Mr Swann on Wednesday for Boston. They are to meet later in Toronto before continuing their trip together. When I spoke to him, Mr Swann—a keen golfer and secretary of the IRI Golfing Society—was doubtful whether he would have any time for his favourite game.

Ellison Moves

George Ellison jnr. has been elected to the boards of the associated companies, George Ellison Ltd., Alfred Ellison Ltd. and Tufnol Ltd. Mr Ellison is the grandson of the late Mr George Ellison, the founder of all three companies.

More news from George Ellison is the appointment of T. J. Rowlands, B.Sc., A.M.I.E.E., to chief engineer and manager of the engineering

T. J. ROWLANDS G. ELLISON, Jr.

department. Educated at Towyn Grammar School, Mr Rowlands later obtained a First Class Honours Degree in Electrical Engineering at the University College of North Wales, Bangor. During the Second World War he was commissioned in the Technical Branch of the R.A.F. Mr Rowlands was previously with English Electric as circuit breaker design-engineer, and later was chief engineer and manager of the switchgear division of Lancashire Dynamo Nevelin Ltd.

Photos at the Fort

Dunlop employees in Japan, India, Canada, Germany and several other countries sent entries to the 11th annual exhibition of photography staged by the Fort Dunlop Photographic Society at Birmingham recently.

The Harcourt Memorial Trophy for the best colour transparency was won by C. R. Coleman, of Fort Dunlop Research Centre. Winner of the Twiss trophy for the best monochrome print was G. L. V. Davies, of the Livery Street Tyre Depot, Birmingham.

* * *

Anglo-American Plastics Ltd. (one of the Commercial Plastics group) announces the appointment of R. S. Swain as their senior representative in the East Midlands area. Mr Swain will be responsible for developing the outlets for Fablothene polythene packaging in this region.

Question Corner—118

(Second Series)

443. What are some of the troubles that may arise in the spraying of synthetic stoving finishes?

(Answer next week)

Answer to Question Corner—117

442. When a plastic material is caused to flow into a mould it is under sufficient pressure to produce stresses of the order of 10,000 to 180,000 psi, in the mould cavity. This causes deformation which is not harmful, provided the stress is within the elastic limit of the mould material.

Dimensions of the mould cavity must be larger than that of the finished product owing to the shrinkage of the plastic material on cooling. The amount of shrinkage is not easy to determine owing to the many factors involved. It is usual to allow a limit of plus or minus 0.001in./in. on the finished product and some typical mould shrinkage allowances are:—

Polymethyl methacrylate .	0.003 to 0.008 in./in.
Cellulose acetate	0.004 to 0.008 „
Polythene	0.005 to 0.040 „
Polystyrene	0.003 to 0.008 „
Nylon	0.005 to 0.040 „

The surface finish of most moulded products demands a smooth and lustrous appearance. These are directly related to the surface condition of the cavity of the mould. Hardened steel is probably the most difficult to polish but it has the advantage of being relatively free from damage by abrasion. Softer metals polish well but are subject to deformation which may cause waviness. A thin layer of chromium assists in preventing rust and provides a more permanent lustre when electroplated onto a polished steel mould.

Finally it is important to remember that proper control of the temperature of the surface of the cavities in injection moulding is very important and provision must be made for this. Temperature cycling cannot be entirely eliminated but can, and must, be maintained within reasonable limits.

(Another question next week)

Polly Ester Says . . .

'Channel black—breakdown in transmission'

Vitafoam's Success Story

NOW BIGGEST LATEX FOAM PRODUCERS IN EUROPE

HOW to sell comfort is a difficult problem. Vitafoam provided an answer this month by opening a new London showroom and inviting the public to feel the comfort of mattresses and chairs upholstered with their latex foam (*RJIP* May 14, 720).

Vitafoam, who claim to be the biggest latex foam manufacturers in Europe, have achieved this position in an astonishingly short space of time. Just on 11 years ago it felt its way into the business with a mere £100 worth of capital. Now it employs 1,100 people in a works area of 800,000 sq. ft.—half of which consists of two former cotton mills bought with the assistance of a Treasury loan of £280,000. This shows Government confidence in a business which exported goods worth £¾m. last year.

This President divan set by Vitafoam has a 6in. latex foam mattress on a sprung base. Retail price of the 3ft. wide divan set is £35; the mattress alone is £23

From a small output the firm has grown until now it produces over 90,000 different latex foam units weekly, from over 1,000 different moulds. It supplys over two thirds of the latex foam used in the furnishing industry, and makes 98% of the seats for British-made scooters and motor cycles. A flourishing trade has also been built up with the car industry: over 40 different models contain seating moulded by Vitafoam.

How has this quick growth been achieved? Part of it is due to a rising demand for latex foam in upholstery, which, up to 10 years ago, was used only in the most expensive chairs. Part of it is due to the quality of the foam itself: its strength and resilience and its lightness and flexibility, which have influenced the modern design of chairs; and certainly a big part is due to the quality of the directors. They are the original team who founded the firm in 1949: Norman Grimshaw, A.I.R.I., chairman and joint managing director; Graham H. Smith, L.I.R.I., joint managing director; Alfred Broadbent, A.I.R.I., works director; Frederick W. Whitehead, sales director; and Fernly A. Parker, secretary.

The average age of the directors is 43; Mr Grimshaw is only 38. He started his working life with Dunlop and is rapidly becoming a well-known figure in the industry: this year he has been elected chairman of the British Latex Foam Manufacturer's Association.

Young directors have meant progressive ideas, and the company claims to have the most up-to-date latex foam manufacturing plant in the world. It was designed and installed by their own engineering staff. They are continuing to develop automatic methods of production in order not only to cut costs, but also to speed up delivery — an important point when so much of their production is geared up to supply the furniture industry. Most of the rubber used is natural, but the firm is using increasing amounts of the International Synthetic Rubber Co.'s Intol synthetic latex—in fact as much as they can get, according to one executive.

It is quite clear that the next 10 years will see more expansion from the firm. In the immediate future sales of mattresses are likely to jump —a full range, in six widths, is being manufactured—and the company is installing new machinery which will produce rubber underlay at the rate of four yards a minute. The company believes it has another winner in a new solid moulded rubber webbing, called Vitaweb, which was introduced a few months ago.

CORRESPONDENCE

To the Editor

Keeping Up With The Davy Joneses

Sir,— You raise the problem, in your amusing editorial note in *RJIP* April 30, of smoking under water. It seems to me that there is a simple solution. PVC floats could support ebonite, phenolic or perhaps melamine cigarette holders. From these, polythene tubes, equipped with a rubber plug at the end, could lead downwards into the depths and be readily insertable into frogmen's, or frogwomen's, suits.

This would satisfy the nicotine addict and benefit at once the Chancellor of the Exchequer and the manufacturers of rubber and plastics.

Yours,

Hevea Do Brasil.

Colchester,
May 15 1960.

Bonding Plastisols to Steel

A new thermosetting adhesive, called Silverlock F100, designed specifically for bonding PVC compounds —either in the form of plastisol or a calendered film—to steel and other metals is now being marketed by BTR. It is claimed to be the first successful adhesive available in this country for bonding plastisols to steel —opening the way to a cheaper process for coating sheet steel for applications where plain colours are acceptable. Complex metal shapes normally coated with plastisols may now be bonded, thus increasing the efficiency of the coating.

BTR say that steel sheet bonded with Silverlock F100 to a 0.010in. thick coating of plastisol may be elongated 35% without weakening the bond or damaging the vinyl coating.

The adhesive is a low-viscosity, solvent-based type and may be applied by spray, brush, float or roller to metal. After air drying, the adhesive is prebaked for times which can vary from five minutes at 365°F. to 40 seconds at 410°F., the temperatures being that of the metal. The plastisol is then applied and gelled in the normal way. In cases of vinyl sheet slight laminating pressure is used.

IKD Name Change

The Internationale Kautschukburo, Sektion Deutschland, has changed its name and will in future be known as Internationale Kautschukinstitution, Sektion Deutschland. The address is (16) Frankfurt/Main 1, Düsseldorferstrasse 14, Germany.

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Swedish Rubber Meeting

ACCENT ON SYNTHETIC RUBBER

THE 10th anniversary of the Sveriges Gummitekniska Förenings was celebrated in the form of a conference held at Grand Hotel, Saltsjöbaden, on May 12 and 13. The chairman, Mr B. Särnö; the vice-chairman, Dr S. Hagman; the secretary, Mr E. Jonsson; the treasurer, Mr C. Nordenskjöld; together with other members of the committee, must be congratulated upon the excellent organization of the main business of the meeting and also upon the pleasant social activities.

Synthetic rubber was the main theme of the various lectures and it fell to Mr R. Hickson, of the International Synthetic Rubber Co. Ltd., to present the first paper concerning the effect of polymer gel content on the processing characteristics of SBR compounds. Mr J. B. Larkin, of Koninklijke/Shell followed with a description of the ways in which specialized applications may be satisfied by using SBR. The last paper before lunch on the 12 was given by Mr A. Dräxler, of Bunawerke Hüls, and consisted of a discourse on the properties of special types of SBR in such applications as cables.

The afternoon session featured a summary of the development of many kinds of polymeric materials by Mr C. S. Pyne, of the Chemical Division of the Goodyear International Corporation, and Mr H. Horn, of Du Pont du Nemours, Switzerland, then read a paper entitled 'Blends of Neoprene and SBR' in which he itemized the different characteristics of the two polymers and described vulcanizing systems suitable for certain blends. Behaviour of various blends to a number of conditions, such as attack by ozone, oils, etc., also the processing and adhesion properties of such blends were discussed.

A film by Farbenfabrieken Bayer AG showing processing and testing of rubber completed the first day's work, but before this Mr N. B. Roberts gave a contribution from Polymer Corporation Ltd., describing a towing device consisting of adjustable wheels some 2¼in. in diameter which, it is claimed, can be used to obtain a closer approximation to the performance of actual tyres than is obtainable from laboratory abrasion machines; such a device is very useful when only small quantities of experimental polymers are available for testing.

Replacing Natural

On the 13, Dr G. Kraus, of Phillips Petroleum Co. delivered a lecture about the new rubber *cis* 4-polybutadiene, in which he explained that this product may be used to replace part of the natural rubber in such application as truck tyres, where heat build up problems militate against the employment of SBR. Not only does *cis* 4-polybutadiene hold promise of being cheaper than natural rubber but its performance on the road is superior.

Following Dr Kraus, Mr P. W. Cornell, of the Goodrich-Gulf Co. dealt with another comparatively new synthetic rubber, namely *cis*-1, 4-polyisoprene. Mr Cornell described the ways in which the introduction of 3, 4 configuration in the main 1,4 polymer is detrimental to certain properties. He concluded that less than 5% of 3,4 configuration, high molecular weight and loose gel structure are the features necessary in polyisoprene in order to achieve the highest tensile, lowest heat build up and uncured tackiness similar to natural rubber.

A paper by W. C. Smith and R. L. Zapp, of Esso Research Ltd., entitled 'Advancing Technology in Butyl Rubber' was read by Mr Zapp. This paper dealt with the employment of sulphur donors in place of elemental sulphur for improved heat resistance and, for extremely high temperature resistance, resin cures were advocated. This lecture included a description of the new chlorinated butyl, which allows blending with other polymers and yet maintains good vulcanizing behaviour.

It was fitting that a Swedish author should close the conference and Mr A. Svensson, of Skelleftea Gummifabriks AB described modern techniques in retreading.

Discussion following the various papers was lively and gave testimony to the interesting viewpoints and data presented.

No account of this conference would be complete without mention of the banquet which, under the genial direction of Mr Särnö and with the wholehearted support of the staff of Grand Hotel, Saltsjöbaden, was an unqualified success. During the course of the banquet Mr W. Bask, of Finska Kabelfabriken, was presented with the TSGF diploma and Mr J. Willums presented a handsome chairman's gavel to Mr Särnö as a token of esteem from the Phillips Petroleum Co.

Close to 150 delegates attended the meeting, a record for the SGF.

Representatives of the Dutch rubber industry visited the elastomers research laboratory of Du Pont (UK) Ltd. this month. The party consisted of five members of the company's distributors in Holland, R. S. Stokvis and Zonen N.V. of Rotterdam, and 38 of their customers. The party was addressed by members of the Du Pont's elastomer chemicals department and after lunch visited the company's laboratory at Hemel Hempstead before returning to Rotterdam in the evening

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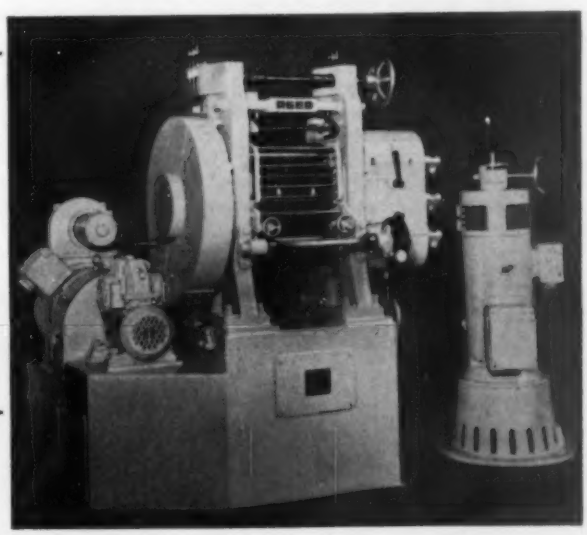

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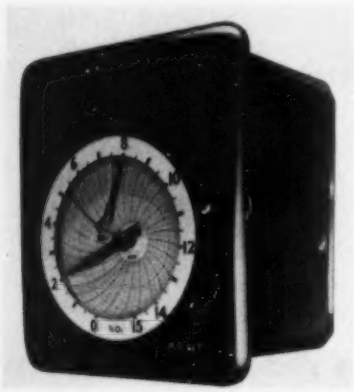
Robots for Research

PREVIEW OF INSTRUMENTS, ELECTRONICS AND AUTOMATION EXHIBITION

MODELS of a robot chemist which can perform complete chemical analyses, either in the laboratory or in the plant, will be shown by Technicon at the Instruments, Electronics and Automation exhibition, which opens at Olympia on Monday May 23. This 'Auto-analyzer' works by analysis through a continuous and dynamic flowing



Commander KE electronic circular-chart recorder shown by Kent

reagent system. Within it a sample is continuously withdrawn, and the appropriate reagents are in a state of continuous proportional confluence, so that the difference between the reagent blank and the sample is continuously measured and recorded. One laboratory model of this system on view will carry out analysis of discrete samples at rates up to 60 determinations an hour.

PTFE will be the main feature on the Permali stand and applications of Permaflon from blocks, sheets, tube, rods, thin wall tubing, copper clad laminates and dispersion coatings, will be shown, together with Permacast epoxide resin components with a special emphasis on encapsulated and potted circuit assemblies.

Fibreglass reinforced laminates will illustrate electronic applications from various grades of flat sheet, rod and tube. There are also several examples of glass fibre mouldings and covers.

Automatic control of the thickness of flowing sheet materials will be demonstrated on the Ekco Electronics stand by means of an Ekco Type N582 Auto-standardization Gauge. The N582 automatically carries out half-hourly checks on the measuring heads, correcting for contamination of the heads by dust, oil and source decay and amplifier drift.

Another Ekco display will show the use of their nucleonic gauging equipment for the automatic control of a coating machine. Here, a single-channel gauge, Type N565, is used with an extension meter and auto control unit to ensure accurate control of the coating. Similar installations are in use in various industries—controlling the coating to an accuracy of 12 millionths of an inch in one case.

An instrument designed to control to a pre-set programme and record process variables such as temperature, pressure and vacuum is the Numalex Programme Controller, which will be featured by Cambridge Instrument Co. In its simplest form, the controller will maintain the temperature of a process at a 'desired value' for a specified period, switch off, and indicate completion of cycle. With two measuring systems, a recording element, and suitable sub-units, the instrument can be made to control up to two separate variables and switch in or out a theoretically unlimited number of separate 'functions' (such as warning lights, operating a vent) during the course of the programme, which can last several days.

Commander electronic instruments will be shown by George Kent, of Luton, and include a circular-chart recorder for use with a load cell, incorporating four-position electric control.

Other exhibits include electronic teaching equipment and a new range of balances (Griffin and George), a continuous turbidity meter (Electronic Instruments Ltd.), while the Electrical Development Association's stand will bring to life part of their book 'Process Integration and Instrumentation.'

The exhibit will illustrate one section and will cover level controls for solids, liquids and gases. The types shown will include isotope, photo-electric, conductance, capacitance, resistance back pressure air and float apparatus.

Quicker Hygiene

Cleanliness standards have been raised and cleaning time reduced now that J. Lyons and Co. Ltd. are now using Warerite plastics to replace the plywood and odourless paint linings of their tray-carrying delivery vans. New vans now coming into use are lined on two side walls, bulkhead and half roof with Warerite in blue stardust design; the other half of the roof is a fibreglass skylight. Floors are of aluminium, and the company says that the complete interior of one of these tray-carrying vans can be wiped clean in half the time.

The new 40,000 ton Orient-Line flagship, SS Oriana will be the first liner to be completely equipped with glass fibre lifeboats.

Standing out this summer will be Susan Small cocktail dresses. Bonded with British Geon's Hycar synthetic latex, Solena underskirts help to produce the flared effect in summer dresses, giving support without weight. They are made by Bonded Fibre Fabric Ltd.

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The ANALYSIS of RUBBER AND RUBBER-LIKE POLYMERS

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R.A.B.R.M. MANUAL No. 3

By WILLIAM C. WAKE
M.Sc., Ph.D.(Lond.), F.R.I.C., F.I.R.I.
HEAD of CHEMISTRY DIVISION
RESEARCH ASSOCIATION of BRITISH RUBBER MANUFACTURERS

THE first modern work devoted solely to this important subject to be published in the English language. In addition to the analysis of natural and synthetic rubbers, the author deals with rubber-like plastics such as Polyethylene, PVC, PVDC, PVA and Urethanes. Also discussed are the identification of compounding ingredients used in the manufacture of rubber and rubber-like polymers.

It will unquestionably become a standard work and is a "must" for all analysts interested in this subject.

CONTENTS:

Extraction Procedures - Qualitative Analysis for Polymer Type - Elemental Analysis of Extracted Polymer - Direct Determination by Functional Group Analysis - Solution and Dissolution Methods - Quantitative Cracking and Distillation Methods - Carbon Black in Rubber - Ashing, Wet and Dry, and the Determination of Trace Metals - Analysis of Extracts and Blooms - Statistical Aspects of Analytical Work.

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Rubber Statistics

MALAYA — UNITED KINGDOM

DETAILS of Malaya's ocean shipments and imports for the month of February have now been issued by Malaya House. The following tables summarize the information received:

Ocean shipments to:	Sheet Crepe	Latex
UK	9,533	2,709
USA	9,292	1,900
South Africa ..	1,915	108
Canada	2,966	10
India	1,761	—
Australia	2,482	586
Czechoslovakia ..	2,514	82
France	6,697	922
Western Germany	5,716	1,446
Italy	3,727	837
Spain	2,657	218
Yugoslavia ..	2,618	57
Brazil	3,050	—
Japan	7,399	1,478
Others	13,928	1,014
	76,255	11,367

Imports from:	Total
Indonesia:	
Borneo	8,374
Sumatra	23,943
Others	2,987
	35,304
British Borneo	3,850
Thailand	3,585
Others	1,102
	43,841

Total ocean shipments during February amounted to 87,622 tons. Even allowing for the shorter working month, this represented a sharp drop compared with the January figure of 101,218 tons; in fact, February's was the lowest level of ocean shipments for over a year. In particular, shipments to Western Germany were halved compared with the previous month, while those to Japan were down by one-third.

Imports into Malaya during February increased by some 2,500 tons, compared with the previous month, and except in December last when imports totalled 44,356 tons, had not been exceeded for more than a year.

United Kingdom

The Secretariat of the International Rubber Study Group has now released details of the UK rubber position up to the end of February.

Imports of natural rubber during the first two months of the year totalled 24,751 tons of crude and 5,795 tons of latex, or some 6,500 tons less than were imported during the first two months of last year. At the same time, 12,169 tons were delivered from the stockpile, while re-exports, at 6,968 tons, were some 800 tons up on last year. The net effect of these imports and exports produced a new supply of 35,747 tons, or nearly 5,000 tons more than the 1959 figure for the same period. Consumption of natural during these two months amounted to 25,425 tons of crude and 3,639 tons of latex, giving a total which was almost the same as that for last year. Stocks of natural on hand at the end of February stood at 17,011 tons of crude and 5,484 tons of latex, having risen by more than 2,000 tons since the beginning of the year.

During these two months 11,809 tons of synthetic were produced in the UK. In addition, 9,028 tons were imported, and after allowing for exports of 2,450 tons there remained a new supply of 18,387 tons, compared with 11,762 tons at the end of February 1959. Consumption during the period amounted to 16,884 tons as against 11,544 tons, and included 16,404 tons of dry rubber and 480 tons of synthetic latices. Stocks of synthetic rubber on hand at the end of February amounted to 9,256 tons, stocks having stood at 12,111 tons a year earlier.

Reclaim rubber production during these months amounted to 7,661 tons and there remained, after allowing for imports and exports of reclaim, a new supply of 5,635 tons as compared with the previous year's figure of 5,299 tons.

PLASTICS IN CABLES

Continued from page 765

the surface of the core. This is achieved by applying the ink in some way after which the core is passed through a heated tube to weld the ink to the core. There are several methods of applying the ink, the most common being by spring-loaded wheels revolving rapidly round the core. Another method employs small spray guns revolving at high speeds.

Conclusions

Although basically the extrusion of plastics is a simple matter, the subject has been growing more complicated as time progresses. The change from the short screw to the long screw, and from low speeds to high speeds has resulted in certain fundamental changes in processing techniques. Moreover, advances are being made continuously mainly in the direction of higher speeds and of the subsidiary processes needed to control them. Any problem therefore, should be tackled in the light of the new conditions and under no circumstances must the older techniques be allowed to confuse the situation. It is probably rare that the old ideas of extruder temperatures will solve problems and a fresh approach must be made to each problem if progress is to be made.

(To be concluded)

Rubber Crop Returns

Unless otherwise indicated the figures quoted, to the nearest thousand lb., represent crop returns for the month stated and for the number of months of the planting company's financial year to date. Corresponding figures are given in parentheses.

HARRISONS AND CROSFIELD

March

Bukit Kajang.—106. 3 mths—323.
Castlefield.—238 (236). 9 mths—2,408 (2,116).
Golden Hope.—651 (633). 1 mth—651 (633).
Holyrood.—70 (58). 3 mths—255 (201).
Hongkong.—25 (25). 3 mths—87 (81).
Hoscote.—232 (214). 9 mths—2,159 (2,183).
Killinghall.—33 (42). 9 mths.—390 (393).
Kuala Selangor.—59 (53). 3 mths—188 (169).
Kulai.—173 (196). 5 mths—868 (1,008).
Lanadron.—362 (359). 3 mths—1,206 (1,161).
London Asiatic.—1,443 (1,305). 3 mths—4,686 (4,306).
Malaysia.—46 (43). 3 mths—173 (142).
New Crocodile.—209 (199). 1 mth—209 (199).
Pataling.—1,091 (997). 5 mths—6,626 (5,757).
Prang Besar.—302 (206). 12 mths—3,212 (2,307).
Sandac.—103 (82). 12 mths—969 (918).
Sapong.—146 (142). 3 mths—449 (424).
Seaport.—63 (64). 9 mths—654 (698).
Malayalam.—457 (270). 12 mths—7,281 (6,969).
Lunuva.—107 (90). 3 mths—317 (317).
Allied Sumatra.—680 (656). 3 mths—2,239 (2,256).
Asahan.—88 (121). 8 mths—789 (979).
Bah Lias.—150 (137). 5 mths—783 (805).
Central Sumatra.—66 (75). 9 mths—643 (817).
Lankat Rubber.—60 (50). 12 mths—830 (734).
Mendaris.—139 (145). 3 mths—509 (551).
Namoe Tongan.—245 (84). 7 mths—1,709 (1,711).
Sialang.—172 (199). 2 mths—384 (386).
Soengei Rampah.—42 (42). 3 mths—133 (150).
Tanah Datar.—57 (60). 3 mths—193 (207).
Tandjong.—118 (142). 9 mths—1,414 (1,367).
Toerangie.—179 (172). 5 mths—1,010 (1,030).
United Lankat.—28 (25). 3 mths—95 (83).
United Serdang. 790 (725). 7 mths—6,231 (6,419).

THOMAS BARLOW

March

Bradwall (FMS).—113. 3 mths—396 (318).
Chersonese (FMS).—55. 3 mths—200 (153).
Highlands and Lowlands.—1,623. 3 mths—5,557 (5,240).
Krian.—3. 3 mths—16 (16).
Sungei Krian.—139. 3 mths—492 (425).
Muar River (including Klabang and Manchester North Borneo).—248. 15 mths—3,875 (3,930).

SHARPE ESTALL

March

Anglo-Johore.—45 (30). 8 mths.—282 (272).
Bekoh CRE. — 185 (167). 12 mths—2,431 (2,386).
KPRP.—56 (55). 12 mths—738 (652).

Rubber and Plastics Stock Market

A REVIEW OF PRICES AND TRENDS

MAINLY cloudy and overcast with only the occasional bright interval. This has been the pattern in stock markets during the past few weeks. Recently the index — the investors pocket sized barometer — plumbed a new 'low' for the year; all was gloom and despondency.

Suddenly last Wednesday there was a dramatic change in the climatic conditions throughout the whole of Throgmorton Street. Since then we report that the industrial share index has recovered a fine 10.4 points to 307.4. So far, however, it would appear that the change round has been mainly a technical one.

The professional 'bears' who have had a wonderful time over the past month or so were frightened by a Professor and moved in quickly to cover their positions. At the same time there was an acute shortage of stock. It did not take much action, therefore, to get the top line shares plussing just about everywhere.

Another factor that has played a major part in boosting sentiment was the flood of good company news that has continued to flow through from a wide variety of industries. Well you cannot say that we did not tell you so. In our last edition we expressed the view that boardroom announcements would be good and went on to conclude 'We feel that it just might turn the scales in favour of a further gentle upswing . . . .'

So far, however, there has been no sign of a substantial revival in investment interest, although the big institutions have become a little more active with their buying and enquiries. What is more, some brokers have started to advise their clients once again that this might be a good moment in the downswing of prices for long term thinkers to return to the market place.

As can be seen from our price tables below shares of the giant IMPERIAL CHEMICAL INDUSTRIES group have made a good recovery. They were marked up immediately following the shareholders meeting last week. Mr S. P. Chambers, in his first address as head of the company, reported that the long term prospect was one of continued prosperity.

Although competition continued to get stiffer both at home and abroad there has been 'great activity' in practically all the company's products so far this year, said the chairman. The home outlook was good and the revival of business in the capital goods industries might be partly offset by hesitancy in some branches of durable consumer goods.

On dividends it was said that in order to reduce the disparity between the two payments the directors had it in mind to step up the interim next September. As regards the loan stock

Continued on page 784

Share Price Movements

Par Value	Company	1960 High	Low	Apr.-May High	Latest
£1	A.E. Ind. Ord.	67/-	54/-	54/9	54/-
5/-	Albright & W. Ord.	30/3	26/3	26/3	27/1½
£1	„ „ „ 5% Pref.	17/3	16/-	16/6	16/9
5/-	Anchor Chemical Ord.	28/3	16/6	16/-	16/6
5/-	Andersons Rub. Ord.	—	—	3/1½	3/1½
£1	Angus Geo. Ord.	47/6	34/9	46/-	46/3
5/-	Ault & Wiborg Ord.	24/-	20/-	21/9	21/6
£1	Avon India Rubber Ord.	46/6	35/9	36/3	36/-
£1	„ „ „ 6% Pref.	20/-	17/6	18/9	18/9
10/-	Bakelite Ord.	47/6	39/9	47/3	47/-
£1	„ 6% Pref.	19/-	16/9	19/-	19/-
£1	Baker Perkins Ord.	54/-	49/9	52/6	51/6
4/-	Bank Bdg. Rubber Ord.	3/9	3/-	3/-	3/-
5/-	Boake (A) Roberts Ord.	30/3	21/6	30/3	30/-
£1	„ „ „ 5% Pref.	17/6	15/-	16/3	16/3
4/-	Brammer H. Ord.	18/-	16/9	17/6	17/9
10/-	Bridge, David Ord.	58/3	53/6	56/-	58/3
5/-	Bright, John Ord.	18/6	15/3	17/3	17/9
2/-	Brit. Ind. Plas. Ord.	8/3	5/3	7/-	6/9
2/-	„ 10% (tax free) Pref.	4/6	4/3	4/6	4/9
£1	British Xylonite Ord.	95/-	78/9	95/-	95/-
£1	„ „ 5% Pref.	17/6	15/-	16/9	16/9
£1	BICC Ord.	61/3	52/6	55/-	54/-
5/-	BTR Ind. Ord.	12/9	9/9	12/-	11/9
£1	„ „ 7½% Pref.	24/3	23/-	23/9	23/9
£1	Courtaulds Ord.	66/9	58/9	61/6	62/6
£1	„ 5% 1st Pref.	17/9	16/3	16/6	16/6
£1	„ 6% 2nd Pref.	21/-	19/9	19/6	19/6
4/-	Cow, P. B. Ord.	8/6	6/9	8/6	8/-
£1	„ „ 5% Pref.	15/6	14/9	15/-	15/-
1/-	Dannimac Mfg. Ord.	12/9	10/3	10/6	10/3
10/-	De La Rue Ord.	74/6	65/6	62/-	65/6
£1	„ „ „ 3½% Pref.	12/-	11/3	11/6	11/6
10/-	Distillers Co. Ord.	39/9	32/9	36/6	34/4½
£1	„ „ 6% Pref.	22/-	20/6	20/6	20/9
£100	„ 5% Conv. Loan	£96	£95½	£96	£96
£100	„ 5½% Unsec. Loan	£97	£90	£90	£91½
10/-	Dunlop Rubber Ord.	28/3	21/9	26/9	27/6
£1	„ „ 5½% Pref.	19/-	17/-	18/-	18/-
£100	„ 3½% 1st Debs.	£78	£74	£76	£76
£100	„ 4½% 2nd Debs.	£87	£85½	£86	£86
£1	Eng. Elect. Ord.	53/6	39/-	40/3	39/3
4/-	Ebonite Cont. Ord.	14/3	12/3	12/6	11/9
£1	English China Clays Ord.	95/-	74/6	74/9	74/6
£1	Goodyear Tyre 4% Pref.	12/9	11/6	11/9	11/9
5/-	Greeff Chem. Ord.	33/6	29/3	34/3	34/6
10/-	Greeff Chem. 5½% Pref.	9/-	8/6	8/9	8/9

Par Value	Company	1960 High	Low	Apr.-May High	Latest
5/-	Hackbridge Hldg.	17/6	14/9	15/7½	15/-
4/-	Greengate & Irwell Ord.	6/6	5/3	5/3	5/3
£1	Harrisons & Crosfield Dd.	64/-	51/6	53/9	52/-
1/-	Hunt & Moscrop Ord.	2/9	1/9	2/-	2/1½
£1	Imp. Chem. Ord.	62/6	56/6	56/-	58/7½
£1	„ „ 5% Pref.	18/-	16/6	16/9	17/-
£100	„ 4½% Unsec. Loan	£89¼	£86	£87	£86
£100	„ 5½% Conv. Loan	£194	£175	£182	£180
1/-	Kleemann (O. & M.) Ord.	10/3	8/3	9/6	8/6
£1	„ „ 6½% Pref.	19/-	17/-	18/9	18/-
2/-	Lacrinoid Prod. Ord.	5/-	3/-	3/6	3/3
5/-	Laporte Ind. Ord.	32/-	25/3	27/6xc	26/-
£1	„ „ 7½% Pref.	24/3	23/3	23/9	23/3
£1	Leyland & Birm. Rubber Ord.	57/-	48/-	51/3	49/6
£1	„ „ „ 6% Pref.	19/-	17/6	18/9	18/9
2/-	London Rubber	14/9	11/-	12/6	12/3
£1	„ 6% Red. Cum. Pref.	20/-	18/9	18/9	18/9
£1	McKechnie Bros. Ord.	71/6	64/-	64/-	64/-
£1	„ „ 'A' Ord.	69/3	58/9	62/-	60/-
£1	„ „ 6% Cum. Pref.	16/-	18/-	17/-	17/-
5/-	Monsanto Chem. Ord.	28/-	23/3	24/3	23/6
£1	„ „ 3½% Pref.	12/9	12/3	13/-	12/6
£100	„ „ 6% Debs.	£103½	£102	£102	£102
5/-	Miles (H.G.) Holdgs. Ord.	11/3	9/9	11/-	10/-
£1	North British Rubber	21/3	18/9	19/-	19/-
5/-	Plastic Enginrs. Ord.	25/-	20/-	22/9	23/6
5/-	Redfern Holdings Ord.	5/9	4/3	5/9	5/9
2/-	RFD Ltd. Ord.	6/6	5/-	5/6	5/4½
£1	„ „ 5½% Pref.	14/6	12/9	13/9	13/9
2/-	Rubber Imp. Ord.	7/9	5/-	5/-	5/-
2/-	„ „ 'A' Ord.	7/-	4/-	5/-	4/-
£1	„ „ 5% 1st Pref.	15/-	11/3	12/3	12/3
5/-	Rubber Reg. Ord.	19/3	17/-	17/-	17/-
4/-	Shaw Francis Ord.	27/6	21/3	23/9	21/6
2/-	Silentbloc Ord.	13/3	10/-	11/-	11/3
5/-	Storey Bros.	35/-	28/3	35/-	32/-
2/-	Sussex Rubber Ord.	2/3	1/3	2/3	1/9
5/-	Sutcliffe Speak Ord.	15/9	11/-	13/9	15/6
£1	Turner & Newall Ord.	115/-	100/-	105/-	100/-
£1	„ „ „ 7% Pref.	25/-	23/-	23/3	23/3
5/-	Universal Asbestos Ord.	42/9	32/6	39/9	40/9
5/-	Viscose Dev. Ord.	15/9	14/9	15/-	16/6
5/-	Warne William (Holdgs.) Ord.	18/6	17/-	17/-	17/-

Rubber Markets

LONDON

Nervous covering of near positions again dominated the market during the past week but distant positions were relatively neglected. Prices fluctuated widely following erratic movements at Singapore. Although the spot price of No. 1 RSS fell from 'peak' levels, it was still at a very high premium over forward positions. Latest prices are as follows:—

No. 1 RSS Spot 41¼d. nominal.

Settlement House:

June 41¼d.-41½d.

July/September 38½d.-38¾d.

October/December 35¼d.-35½d.

January/March 34d. nominal.

April/June 33d. nominal.

No. 1 RSS cif Basis Ports:

June 38⅝d.-38⅞d.

July 37⅜d.-37⅝d.

Godown:

June 132¾ cents nominal.

LATEX

Centrifuged latex per gallon in drums, seller, June 21s. 9d., July 21s. 6d., cif European ports, Spot, seller, 22s. 0d. Bulk, not quoted. Creamed, seller, June 20s. 3d. Normal, seller, June 17s. 2d.

DJAKARTA

No transactions were reported on May 16. Buyers were reserved awaiting news from the American market. The market closed slightly easier.

	Rupiahs per kilo	
	May 16	Previous
Spot No. 1 Priok ..	58.00b	58.00b
Spot No. 2 Priok ..	56.50b	56.50b
Spot No. 3 Priok ..	52.00n	52.00n
No. 1 fine pale crepe, spot	45.60b	45.00b

Tone: Slightly easier.

CEYLON

No. 1 RSS

The price of No. 1 RSS at Colombo on May 16 was 152¾ Ceylon cents per lb.

AMSTERDAM

The Amsterdam rubber market ruled as under on May 16:

	Guilders per kilo	
No. 1 RMA	May 16	Previous
May	3.80	3.90
June	3.69½	3.85
July	3.65½	3.69
August	3.59½	3.69
September ..	3.53	3.69
July/Sept. ..	3.59½	3.69

Sales: Nil. Tendency: Easy.

SINGAPORE

The market opened slightly lower on disappointing overseas advices on May 16. Sellers were holding off but prices eased later on fairly heavy upcountry selling. Lower sheets were neglected. Prices continued to lose ground in the afternoon under upcountry godown liquidation. Some covering appeared in afterhours' trading which caused the market to finish on a steadier note.

	Straits cents per lb., fob Malayan ports to open ports	
	May 16	Previous Close
No. 1 RSS, June	128½–129	132½–132¾
July	124½–125½	—
No. 2 RSS, June	125⅝–126⅜	—
No. 3 RSS, June	119⅝–120⅜	—
No. 4 RSS, June	115⅝–116⅜	—
No. 5 RSS, June	112½–113½	—
No. 1 RSS, Spot	133½–134½	142 –143
No. 3 blanket, thick remilled crepe, June ..	114½–116½	—
No. 1 fine pale crepe, June ..	132½–134½	—
2X thin brown crepe, June ..	113 –114	—

Tone: Steady.

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums fob at 243.60d. per gallon.

BANGKOK

No. 1 RSS

The price of No. 1 RSS at Bangkok on May 16 was 39.37½ (40.37½) US cents per lb.

NEW YORK

The New York rubber market ruled as under on May 16:

DEALERS' PRICES

	US cents per lb. Ex-dock	
	May 16	Previous
No. 1 RSS, May ..	44½n	44a
June ..	43n	42½a
No. 2 RSS, May ..	44⅜n	43⅝a
June ..	42⅜n	42⅝a
No. 3 RSS, May ..	44⅛n	43⅜a
June ..	42⅜n	42⅛a
No. 1 RSS, Spot ..	44½n	44n
No. 3 amber blanket crepe, July ..	40⅛a	40⅛a
No. 1 latex thin crepe, May	45⅛n	45n
No. 1 latex thick crepe, May ..	45⅛n	44⅛n

FUTURES—REX CONTRACT

	May 16	Prev. Close
May ..	44.50b–45.00a	43.80b–44.75a
July ..	42.45b–42.55a	42.20t
Sept. ..	41.25t	40.72b–40.87a
Nov. ..	40.30t	39.90b–40.10a
Jan. ..	39.50b–39.80a	39.10b–39.40a
March ..	38.60b–38.90a	38.20b–38.50a
May ..	37.60b–38.00a	37.40b–37.70a

Sales: 25. Tone: Very steady.

Rubber futures were quiet on May 16. Covering was later in the day steadying the market after early profit-taking. Traders said that international developments induced some covering here. Physical rubber was very quiet. In the closing stages futures moved higher on covering. Dealings for the day were light.

STOCK MARKET

Continued from page 783

he pointed out that next July was the last date for converting into shares. Mr Chambers declared 'With the progress of the company there can be little doubt that it is in the interest of the owners of this stock to apply to have it converted.'

On expansion shareholders were told that development of the Severnside site had begun and it had been decided to build ethylene oxide and ethylene glycol plants.

The outlook for shareholders is further strengthened by the fact that capital expenditure this year will be relatively low by the combines standards. No new capital is likely to be required until 1961, when the group's investment spending will resume its habitual upward trend.

Earlier to this news had come an announcement which stated that I.C.I.'s PVC output was to be increased by a further 10,000 tons by the middle of next year. The expansion is to take place at the Hillhouse Works in Lancashire, where all the group's PVC is produced.

Canadian Mined Asbestos

Shipments of asbestos from Canadian mines in March rose to 71,579 tons from 69,902 a year earlier, bringing January-March shipments to 204,794 tons compared to last year's first quarter total of 184,689 tons, an advance of 11%. Quebec mines shipped 65,795 tons in the month against 65,334 year earlier and 187,450 tons in the quarter against 171,259 last year.

Warerite Colour Code

The new 40,000 tons Orient liner ss Oriana uses Warerite as a colour code. Any door faced in black indicates it leads to a pantry; baths and laundrettes are of dove grey and lavatories are distinguished with doors of fresco blue for men and terracotta for women. Terracotta has also been chosen for the staff commander's suite, senior officer's suites, alleyways and toilets.

Patent Specifications

Due to pressure on space this regular feature has had to be held over. It will appear next week.

The Michelin branch office and depot in Liverpool is now established in a new building at 57 Hill Street, Liverpool 8 (tel: Royal 5112/3). It serves Merseyside, Caernarvon, Flintshire, Denbighshire, Merioneth, the Isle of Man and parts of Cheshire and Lancashire. R. J. Stubberfield is the divisional sales manager.

Industry INTELLIGENCE

Technical Data

Stiffener DSC

Four bulletins issued by the Anchor Chemical Co. Ltd., Manchester 11, Nos. 149-152/R/60, give details of the use of Stiffener DSC in natural rubber, neoprene and acrylonitrile compounds, and in sponge rubbers.

Stiffener DSC increases the uncured stiffness of these compounds without significantly changing the properties of the vulcanizates. It is particularly useful in increasing the stiffness of compounds which have been degraded by inclusion of large quantities of plasticizer or by overworking, or by both, and is also of value for the reprocessing of uncured compound salvaged from offcuts and trimmings.

The stiffener, which is normally used at up to 0.5phr, does not contribute to staining and can be used in white or coloured compounds.

New Water Soluble Stoving Primer Resin

Epok Water Soluble Stoving Primer Resin A.1700, which has been developed as a vehicle for industrial stoving primers, is described in a leaflet which can be obtained from Information Department, British Resin Products Ltd., Devonshire House, Piccadilly, London, W.1.

The resin possesses several unique advantages because the usual conventional organic solvents are totally replaced by water. Moreover, it can be thinned to any extent with water alone.

Advantages of this resin are that fire hazards are eliminated, health risks are far less and the purchase of costly fume-extraction equipment can be minimized, equipment is easily cleaned with water and costs are therefore lower, pigments disperse readily and by employing aqueous pigment lower milling times will be obtainable. Primer films based on Epok A.1700 are flexible and possess excellent humidity and salt spray resistance, both alone and when overcoated with conventional top coats. They are suitable for use in many industrial applications including car bodies machinery and office equipment and for such domestic appliances as cookers, refrigerators and washing machines.

Cold-Sprayed Hypalon Coatings for Porous Surfaces

Hypalon coating formulations have been developed which can be cold-sprayed to provide a continuous film over porous substrates. Information on this type of Hypalon coating is given in Du Pont Elastomer Chemicals Department Report BL-363, by I. D. Roche, available in the UK from the Du Pont Co. (UK) Ltd., 76 Jermyn Street, London, S.W.1.

Two Hypalon cold-spray formulations are given, one for coating materials with fine pores, such as cut urethane foam and elastomer foam, and the other for coating materials with coarse pores, such as curled animal hair. The compositions can be prepared by standard dispersion techniques for Hypalon using a ball or pebble mill.

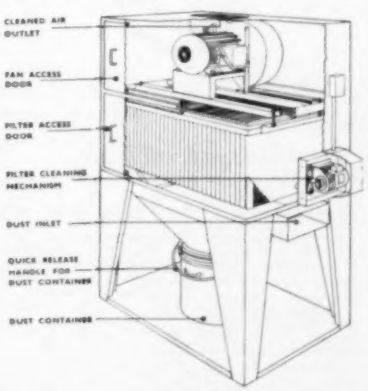
A unique feature of these coating compositions is that they utilize a solvent which is a blend of two or more solvents which individually are non-solvents for Hypalon. A blend of acetone and hexane is used in the two formulations given in the report. The coating compositions thus prepared are diluted with another solvent to a suitable viscosity for spraying, blends of aliphatic and aromatic solvents being the best diluents. The diluted compositions can be applied with standard cold-spray equipment.

Machines, Materials and Equipment

Dust Control Unit

Dallow Lambert, of Thurmaston, Leicester, have now introduced the Unimaster 250 series dust control unit. This larger capacity collecter with 250 sq. ft. of filter cloth area, is designed for dealing with heavier dust concentrations.

It is said to be suitable for heavy duty individual machines or can be



used as a small multiple connexion plant, having low initial and running costs in comparison with equipment that is specially designed and tailor-made for a specific application.

Runs of ducting can be attached to this collector; if an installation is disbanded the collector is re-usable on another application; alternative fans and motors, filters and dust containers can be supplied from a standard range.

Reclaiming Files

Used files are sometimes reclaimed by pickling in an acid bath. A more effective process of electro-chemical etching has been developed, as a result of which the number of files issued at the works concerned has dropped from 850 to 300 per week.

The files are given a first bath in caustic soda solution. They are then placed as anodes in an electrolytic bath with sulphuric acid electrolyte and stainless steel plate as cathodes.

New Publications

Regal Blacks

Cabot Technical reports RG103 and RG104 are issued in booklet form and give information on two oil furnace blacks Regal 300 and 600 (*RJIP* April 2, 523). These blacks are produced by an exclusive new process for which patent applications have been made and are claimed to have unique properties. Regal 300 is a low modulus black giving rubber properties similar to channel black but with a faster curing rate than that of HAF. It offers a combination of properties not previously obtained by a single black type. Regal 600 is similar to ISAF black but offers higher tensile strength and elongation together with lower modulus and hardness, and is recommended for low hardness quiet ride passenger tyre treads.

Industrial Purchasing

A number of articles on various aspects of industrial purchasing have appeared from time to time in *The Purchasing Journal*, the official organ of the Purchasing Officers Association. They have been brought together in a 64-page booklet available, price 6s., from the Association at Wardrobe Court, 146a, Queen Victoria Street, London, E.C.4. The contents include: Lease or Buy, Buying Engineering Supplies; Hedging on Futures Markets; Organization in a Purchasing Department and The Price Aspect of Purchasing.

Ketones

A 48-page booklet describing ketones as solvents and chemical intermediates is published by Union Carbide International. It contains up-to-date information on 15 ketones and diketones that are available in commercial quantities from Union Carbide. It includes information on applications, formulations, physical properties, solvent properties, constant-boiling mixtures, shipping, storage, handling, physiological properties, specification limits, and test methods. A comprehensive bibliography on ketones and their uses is a feature of the new publication.

PATENT LIST

Printed copies of the Specifications in the following list, published by permission of the Controller of H.M. Stationery Office, can be obtained from the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d., including postage, but about six weeks after the date of this publication will usually elapse before they come available. Orders with remittance may be sent in advance to the Patent Office, and will be fulfilled immediately the Specifications are published.

COMPLETE SPECIFICATIONS ACCEPTED

Open to public inspection on April 6 1960

Esso Research and Engineering Co. Olefin polymerization. 832,225.

Leuna-Werke W. Ulbricht Veb. Process for the production of polyamides. 831,981.

Ciba Ltd. Dry preparations capable of yielding cation-active melamine resin solutions by dissolution in water and ripening and process for their manufacture. 831,986.

Deutsche Gold- Und Silberscheideanstalt Vorm. Roessler. Process for the properties of unsaturated polyester resins. 831,987.

Ciba Ltd. Manufacture of N-acylamino compounds. 832,080.

Phillips Petroleum Co. Process and catalyst for polymerization of polymerized hydrocarbons. 832,083.

Esso Research and Engineering Co. Copolymers of ethylene-propylene. 831,989.

Vereinigte Glanzstoff-Fabriken A.G. Process for the continuous polycondensation of dimethyl terephthalate with ethylene glycol. 832,088.

Belling and Lee Ltd. Methods of captivating a thermoplastic sleeve on a flanged member. 832,090.

Phillips Petroleum Co. Polymers and process and catalyst for production thereof. 831,994.

Imperial Chemical Industries Ltd. Laminated sheet materials. 832,047.

Du Pont De Nemours and Co., E.I. Coating compositions and coated films. 831,995.

Ciba Ltd. Anthraquinone vat dyestuffs and process for their manufacture. 831,880.

Badische Anilin- and Soda-Fabrik A.G. Water-soluble copolymers deriver from acrylamide, methacrylamide and acrylic acid esters. 831,881.

Olin Mathieson Chemical Corporation. Manufacture of boron halides. 832,096.

Goodrich Co., B.F. Process for preparing alkylated and aralkylated phenolic condensation products. 831,828.

Bakelite Ltd. Laminated articles. 832,268.

Phillips Petroleum Co. Irradiated olefin polymers. 831,896.

Badische Anilin- and Soda-Fabrik A.G. Production of water-soluble copolymers. 831,832.

Esso Research and Engineering Co. Stable butyl rubber latices. 831,833.

Rohm and Haas Co. Compositions comprising a thermoplastic copolymer and a thermosetting aminoplast resin. 831,898.

United States Rubber Co. Rosin modified unsaturated alkyds and copolymers thereof. 832,010.

Soc. Des Usines Chimiques Rhone-Poulenc. Polymerization of ethylene. 831,899.

Du Pont De Nemours and Co., E.I. Elastomeric material. 831,836.

Dow Chemical Co. Hydroxypropylation of hydroxy compounds. 831,900.

Sun Oil Co. Manufacture of olefin polymers. 831,838.

Hoffmann-La Roche and Co., A.G., F. Manufacture of polyene compounds. 831,901.

Hercules Powder Co. Processes for the polymerization of 3, 3-disubstituted oxetane. 832,283.

Imperial Chemical Industries Ltd. Process for the production of terephthalic acid. 831,902.

Phillips Petroleum Co. Method for production of 1-olefins. 831,910.

Western Electric Co. Inc. Stabilized hydrocarbon polymeric materials. 832,024.

Esso Research and Engineering Co. Irradiated resins. 831,842.

American Biltrite Rubber Co. Inc. Machine for continuously curing elastomeric material in sheet form. 832,126.

Farbenfabriken Bayer A.G. Silicone adhesives. 832,037.

Koppers Co. Inc. Preparation of polymeric compositions. 832,303.

Allied Chemical Corporation. Curing ester resins. 832,169.

Kalle and Co. A.G. Flat shaped objects comprising a polyalkylene terephthalate and having a heat-sealable coating layer. 831,931.

Du Pont De Nemours and Co., E. I. Polymeric compositions. 831,925.

Esso Research and Engineering Co. Emulsified oxidised polymer oil latex. 832,147.

E. I. Du Pont de Nemours and Co. Polymerization of vinyl-type monomers. 832,319.

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from 'The Trade Marks Journal'—given below are reproduced by permission of the Controller of H.M. Stationery Office.

PAN

(793,013) Letters and numerals, all made of plastics, and backed with adhesive. Victor Sydney Alston Biggs and Rivelin Ewart Richards, trading as Plastic Adhesive Numerals, Great Horkesley, Colchester, Essex. (Class 16; March 15 1960).

PLANESTA (795,600) Plastics included in Class 17 in the form of sheets and strips, all being either uncovered or covered on one or more sides with laminations of reinforcing or decorative materials, the plastics being predominant. Creators Limited, Plansel Works, Albert Drive, Sheerwater, Woking, Surrey. (Class 17; March 15 1960).

METALASTIK CONTRASONIC

(782,352) Anti-vibration mountings made of rubber and metal, or of artificial rubber and metal, the rubber or artificial rubber predominating, all being goods included in Class 17. Metalstik Ltd., Evington Valley Road, Leicester. (Class 17; March 15 1960).

SPAFAX (790,966). Gutta percha, india rubber, balata and articles made from these substances and included in Class 17; materials for packing, stopping or insulating; asbestos; mica; and non-metallic hosepipes. Frank William Norman, trading as Spa Factors, Midland Bridge Road, Bath. (Class 17; March 15 1960).

Ramos

(B793,469) Bags included in Class 18 made of nylon. Ramsay Ross Ltd., 61 Victoria Road, Romford, Essex. (Class 18; March 15 1960).

Changes of Name

Modernit Rubber and Asbestos Ltd. (467,701), 52/4 Grays Inn Road, W.C.1.—Name changed to Burlington (Plant and Hire) Ltd., on November 16 1959.

E. Raffles and Sons (Aquareign) Ltd. (234,195)., Waterproof Garment merchant, 2 Bradford Road, Ancoats, Manchester.—Name changed to Aquareign Manufacturing Company Ltd., on November 18, 1959.

Harold E. Cirket Ltd. (496,216), Plastic processing machinery manufacturers, etc., 1,264D High Road, N.20.—Name changed to Tufflex Ltd., on November 23 1959.

Del Guerra Oilskin Manufacturing Company Ltd. (102,177), 17 Hills Terrace, Cardiff. — Name changed to Del Guerra Ltd., on October 19 1959.

Increases of Capital

Kalim Rubber Plantations Ltd. (277,534), 10-15 Mincing Lane, E.C.3.—Increased by £1,100,000. in 2s. ordinary shares, beyond the registered capital of £400,000.

Woodville Rubber Company Ltd. (453,853), Burton Road, Woodville, near Burton-on-Trent.—Increased by £10,000, in £1 ordinary shares, beyond the registered capital of £10,000.

NEW COMPANIES

C. Neild Tyre and Rubber Co. Ltd. (654,547).—March 30. Capital: £100 in £1 shares. The first directors are to be appointed by the subscribers. Solicitors: J. H. Lambert and Co., 310/12 Regent Street, W.1.

H.P.W. (Decor) Ltd. (654,585).—March 30. Capital: £10,000 in £1 shares. To carry on the business of manufacturers of and dealers in wooden, plastic and metal mouldings, veneers and frames, etc. The directors are: Henry P. Wickers, 38 Thurloe Square, S.W.7; and Tinou C. Dutry, 32 Old Burlington Street, W.1.

Polyian Polythene Co. Ltd. (654,622).—March 30. Capital: £1,000 in £1 shares. The subscribers (each with one share) are: S. Kaiser, 21 Chadwich Road, Westcliff-on-Sea, Essex (director); B. Lewis, 65 Northview Avenue, Westcliff-on-Sea, Essex (director).

Quad Precision Plastics Ltd. (654,142).—March 28. Capital: £100 in £1 shares. To carry on the business of manufacturers of and dealers in plastic, modelling and moulding materials, etc. The directors are: Alfred H. Leggatt, 19 Keevil Drive, S.W.19. Peter Stockwell, 64 Honeybrook Road, S.W.12. Reg. office: 53 Whytecliffe Road, Purley, Surrey.

H. L. Kinns Ltd. (655,086). — April 1. Capital: £2,500 in £1,500 7 per cent. cumulative preference and 2,000 ordinary shares. To acquire the business of designers and manufacturers of plastic materials, carried on by H. L. Kinns at 14 and 15 Coleman Street, E.C.2. The directors are: Hubert L. Kinns and Mary A. Kinns, both of "Roma," Anniesdowne Close, Hoe Lane, Abinger Hammer, Surrey. Reg. office: 14/15 Coleman Street, E.C.2.

Impregnated Foam Plastics Ltd. (655,087).—April 1. Capital: £2,000 in £1 shares. The first directors are to be appointed by the subscribers. Solicitors: Radcliffe and Co., 10 Little College Street, S.W.1.

Bartley and Co. (Tyres) Ltd. (655,063).—April 1. Capital: £5,000 in £1 shares. To carry on the business of manufacturers and vulcanizers of and dealers in tyres and inner tubes, etc. George Bartley is the first director. Reg. office: 85/7 Blenheim Gardens, Brixton, S.W.2.

A.S.P. Plastics Ltd. (655,060).—April 1. Capital: £6,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in plastics of all kinds, etc. The directors are: Alfred S. Playle, Orchard House, Kneesworth, Royston, Herts.; Edmond J. Sills and Raymond J. Sleet. Reg. office: The Causeway, Kneesworth, Royston, Herts.

Jolli Jumper Co. Ltd. (655,691). — April 6. Capital: £500 in £1 shares. To carry on the business of manufacturers of and dealers in nursery goods, surgical requirements, rubber goods, etc. The first directors are to be appointed by the subscribers. Secretaries: Bradley Securities Ltd., 89 Kingsway, W.C.2.

Coverplas Ltd. (655,474). — April 6. Capital: £500 in £1 shares. To carry on the business of manufacturers of and dealers in fabric materials, plastics, etc. The directors are: Harold F. Faulkner and Corrine Faulkner, both of 28 Belmore Road, Eastbourne; Leonard W. Steggles and Rosina O. Steggles, both of 11 Lansdowne Crescent, Hailsham. Reg. office: 15 Gildredge Road, Eastbourne.

Harrow Tyre Service Ltd. (655,494). — April 6. Capital: £10,000 in £1 shares. The directors are Ronald E. Wise, 20 Cuckoo Hill Drive, Pinner, Middlesex; and Roland J. Battison, 333 Kenton Lane, Harrow, Middlesex. Secretary: R. J. Battison. Reg. office: 74 and 76 Station Road, Harrow, Middlesex.

Dow and Norman Ltd. (655,941). — April 8. Capital: £100 in £1 shares. To carry on the business of importers, exporters and distributors of rubber footwear and goods, etc. The permanent directors are: David Chung Dow NG, 27 Fernside Road, S.W.12, and Norman Chung Tak NG, 95 Manor Park, Yateley, Camberley, Surrey. Reg. office: 23 King Street, E.C.2.

George Brooke (Plastics), Ltd. (656,010). —April 8. Capital: £5,000 in £1 shares. To carry on the business of plastic manufacturers, moulders and manipulators of and dealers in plastic materials of all kinds, etc. The directors are: Roger W. Suddards, 69 Market Street, Bradford 1; Zoe Addison, 1 Avering Cliffe Road, Bradford (directors of Auto Finance Service (Bradford) Ltd., etc.). Reg. office: 69 Market Street, Bradford 1.

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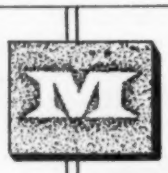

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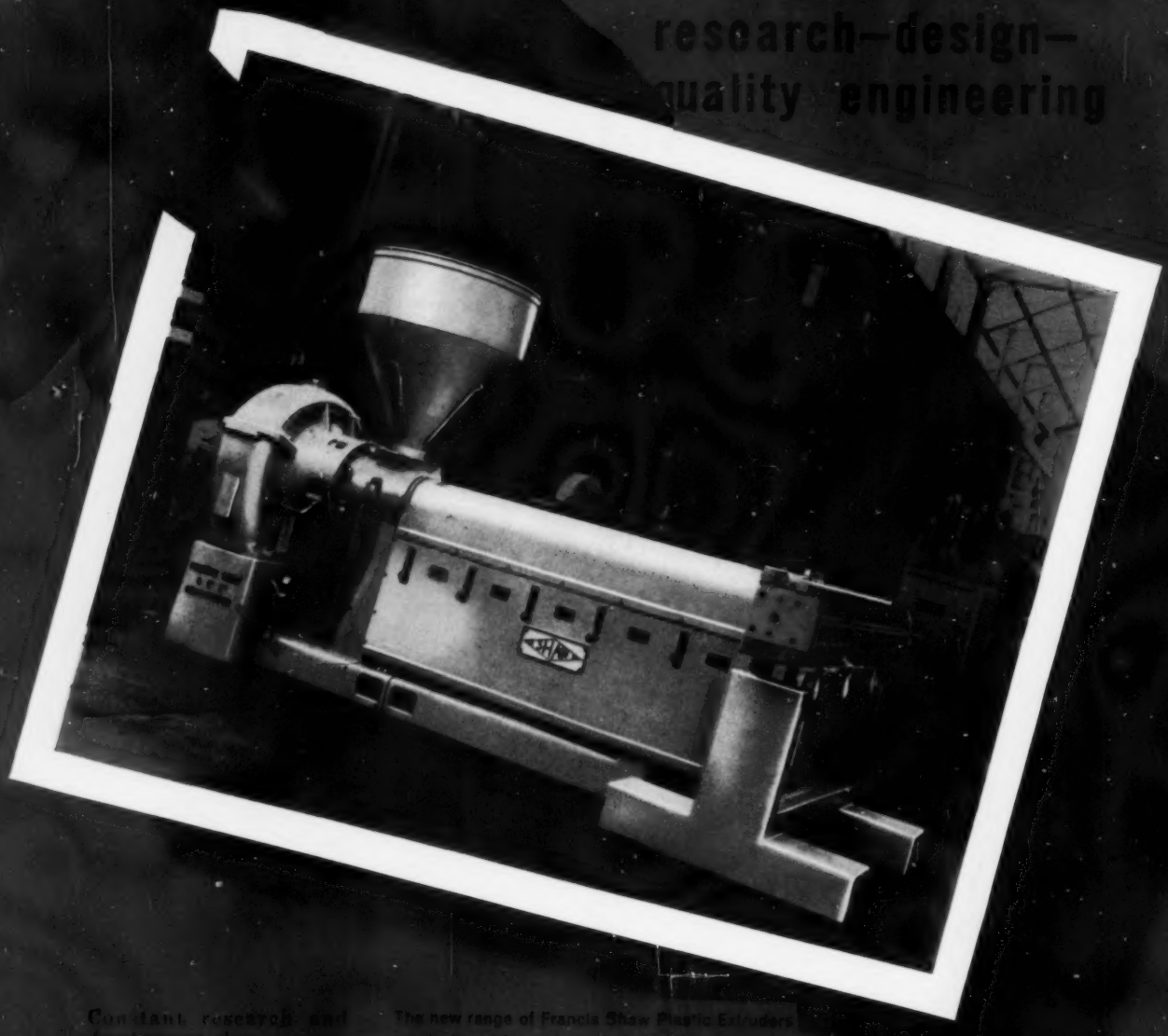

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